PEEPS AT NATURE

TREES

REV. CHARLES A. HALL

PEEPS AT NATURE

EDITED BY

THE REV. CHARLES A. HALL, F.R.M.S.

TREES

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SCOTS PINES (LEFT) IN THEIR NATIVE HAUNTS

TREES

BY

REV. CHARLES A. HALL,
F.R.M.S.

AUTHOR OF "THE OPEN BOOK OF NATURE," "PLANT-LIFE,"
"WILD FLOWERS AND THEIR WONDERFUL WAYS," ETC.

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PREFACE

THE publishers say there is a demand for a book on trees in the "Peeps at Nature" Series, and the following is the response. Within the limitations of so small and inexpensive a volume, it has not been possible to do more than offer some general observations on matters affecting the life of a tree, and to give some description, first of species native to Britain and, afterwards, of some introduced species which catch the observer's eye. The descriptions have been given in order to assist the tyro to identify the species, and have been made in as simple terms as the author can command.

CHARLES A. HALL.

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For permission to reproduce the illustrations of the Wych Elm and the Horse Chestnut the publishers are indebted to Mr. A. B. Jackson, of Kew.

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TREES

CHAPTER I

SOME GENERAL OBSERVATIONS

THE orthodox dictionary definition of a tree is that it is a plant with a single trunk, woody, branched and of large size, and this may be assumed to be fairly accurate, although like most definitions it is subject to exception. For instance, it is quite true that most trees are branched, but there are some which are not. A tree is marked off from a shrub by its single woody trunk. A shrub is also a woody plant, but it produces several stems from the same root.

On account of their prominence and varied appearance, trees have always made a great impression upon the imaginative observer. The interest aroused varies with the artist, the forester, the lumberer or the botanist. With the artist there is the appeal of form and hue. The forester is concerned with arboriculture. The lumberer has an eye to utility and profit. The botanist is most concerned about structure, growth and a thousand and one details of scientific interest.

No amount of scientific knowledge can suffice to destroy the wonder and mystery of a tree. Indeed

the more we learn of the processes and factors which go to the making of a tree, the more wonderful does it become. It is not surprising that from ancient times men have observed trees with a superstitious regard, and that peoples have chosen particular species as national emblems. Of old the Laurel was intimately associated with the god Apollo, the Vine with Bacchus, the Myrtle with Aphrodite, and the Olive with Minerva. In India, the Bo tree is still extensively venerated. The Christmas tree, the use of which has spread from Germany, is a survival of ancient tree-worship. In the Bible, King David is pictured as detecting an omen in "the sound of a marching in the tops of the mulberry-trees." The venerated grove, in which people of old detected eerie voices and worshipped according to their light, has suggested the clustered and fronded columns of much ecclesiastical architecture: the nave of many a cathedral is, as it were, a grove in stone.

One can never cease to wonder that the tiny embryo in a small seed is capable of development into a tall and massive tree which may endure the vicissitudes of climate and stress of tempest for a thousand years or more. Tradition hath it that some of the Cedars of Lebanon have endured for three thousand years. Yews at Fountains Abbey, England, are said to have been in a flourishing condition no less than twelve hundred years ago. Oaks, which are held in national regard in England, are long-lived, and it is estimated that there are English specimens which have survived

from eight to fifteen hundred years. The celebrated Dragon tree (*Dracæna*) of Orotava in the Canary Islands, blown down in 1868, is estimated to have existed no less than six thousand years. It is calculated that the extreme limit of age of the Yew is three thousand years ; the Oak two thousand ; the Chestnut two thousand ; the Spruce Fir twelve hundred ; the White Poplar five hundred ; the Beech three hundred, and the Ash two to three hundred years.

The height and girth of trees are also points of great interest. A tree like the Olive may attain great age, and yet no great size, whereas the Peppermint tree, a species of Eucalyptus found in Australia, will grow to a height of approximately 500 feet. The Oak will reach between 60 and 70 feet, but will be overtopped by the Ash, which may attain 100 feet. The Peppermint tree already alluded to is the tallest giant of the plant world, and the measure of its growth may be realized by the fact that if a specimen grew beside St. Paul's Cathedral, its summit might be fully 60 feet higher than the point of the cross which surmounts the dome. Perhaps the big trees which have appealed most to the imagination, and have gained the greatest fame, are the Sequoias of California. Geographically they are greatly limited, for they are found only at an altitude of from 5,000 to 8,000 feet in the Sierra Nevada. They occur, not on exposed uplands, but in sheltered valleys. Their height ranges from 250 to 340 feet. Their diameter towards the base is re-

markable ; in some cases it is over 30 feet. Readers will have been impressed by a familiar picture of one of these trees through which a sort of gateway has been cut, providing a passage for a coach and passengers. In order to further impress tourists, the trunk of another of these trees has been cut off near the base to provide a dancing floor. One of these trees is estimated to be over three thousand years old. It has endured the stress of existence through the rise and fall of empires, and must have been a mighty growth when Cæsar invaded Britain.

It is a significant fact that a natural order of plants closely related by well-marked features may produce within its boundaries a comparatively insignificant herb and a tree of great growth. For instance, in the order of Leguminous plants we have the well-known Pea and Bean, as well as the more conspicuous Acacia and Laburnum ; and in plants of the Rose order we find the Cinquefoil, which is a creeping herb, the woody shrub like the Bramble or the Rose, and trees like the Apple or the Plum. The order Urticaceæ, which produces the Stinging-nettle, also embraces the Upas tree, of Java, and the Mulberry tree, which provides sustenance for the silkworm. The Dragon trees (*Dracænas*) and the Mexican Yuccas are of the Lily order. On the other hand, the natural order (Salicaceæ), which includes Poplars and Willows, consists entirely of trees and shrubs, and this is the case with the order (Aceraceæ) of which the Sycamores and Maples are members.

In the Willow family we have considerable trees growing on ordinary levels, but on alpine heights there are species which have adapted themselves to their exposed position by adopting a creeping habit. Their stems grow underground and send up leafy shoots to a height of 10 to 24 inches. Everybody is aware that the Japanese, by peculiar cultural methods, can stunt the growth of certain trees so that a specimen of miniature appearance, not more than a foot or so in height, may grow in a small flower-pot and yet be two or three centuries old.

The structure which enables a tall tree to bear a heavy mass of branches and foliage and resist the impact of hurricanes is a marvel of natural mechanics and engineering craft which staggers the imagination. It is beyond the scope of this book to enter into a technical description of the system of tubes, columns and girders that have been naturally evolved in the exigencies of internal growth and response to the stimulus of external conditions. The marvel of the existence of such a structural system is increased by a knowledge of its details, and it gives us respect for the mysterious vital forces involved. What we know of structure and function may reveal the "how" of things, yet it leaves us inarticulate with respect to the "why."

Although science tells us much about the mechanics and chemistry of growth, such information does not dispel its mystery. We realize that an acorn is a potential Oak, and can in some measure watch the

progress of the developing tree, but of the vital urge which impels its growth we have no scientific knowledge. We may talk in evolutionary terms concerning the relationship, descent and development of plants, but when we have ended our discussion we discover that we have been dealing with external expressions of a mysterious vitality which is capable of manifesting itself in diverse forms, and which seems to employ the substances of nature, and the processes of growth, as a means of ultimating its potentialities. Life seems to be more than livingness or a state of being alive, and one cannot help thinking that it is a forceful and purposeful activity. The things that we call living are what they are as a result of action and reaction, or stimulation and response. Life acts, nature reacts. The material which reacts does so in characteristic ways, and the vital force must necessarily run in provided channels ; yet the facts indicate that the vital force has power to modify, and thus to produce variations. The acorn becomes an oak because it responds to the stimulus of life, as one might say, in terms of oak-traditions and long-established oak-behaviour. The resistance of its habit is such as to render it impossible for life to produce in it any but very slight modifications. But the vital urge which is fundamental to growth can accomplish greater things when it acts upon plastic forms which lend themselves to varied development. We do not know *all* that goes to the making of a tree by a mere acquaintance with its anatomy, chemistry and physiology.

Sutton Palmer, R.I.

SILVER BIRCHES IN THE TROSSACHS

The Germinating Seed

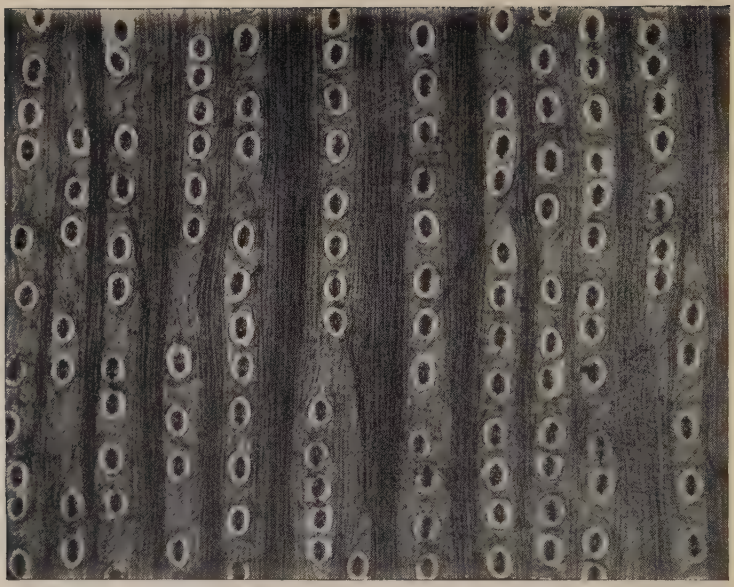
Growth, possibly, is more fascinating in its early stages than in later development. There is the marvel of the germinating seed. As is commonly known, the seed is the product of the sexual union of sperm and ovum. It is an embryonic plant provided with reserves of food to stand it in good stead when it germinates, and it is carefully protected by a skin, or test. The parent plant parts with precious progeny, seemingly casting it off as something negligible. But the parting actually occurs to insure the propagation and perpetuation of the species. While the parent tree is bare of branch, frost-bound and torpid, as it were a sleeping giant, its tiny progeny has perhaps been carried by wind or bird to "fresh woods and pastures new," where it awaits the genial sunshine and warm moisture which will cause it to grow. In the meantime it is protected against the rigours of frost and dangers of extremes of temperature by its hard skin and dry, inactive condition.

The seed may be regarded as a potential tree in a state of hibernation: indeed, it is a potency in repose. Before it was discharged by the parent plant the embryonic tree within was provided with material to maintain it in germination until such time as it can find food for itself. The hard test encloses a fœtal tree with miniature leaves, known as cotyledons, which will seek the light of day, and a potential root, known as the radicle, which will seek the darkness of the earth. If the seed lies in the soil with the radicle upwards, with unerring precision it will curve towards

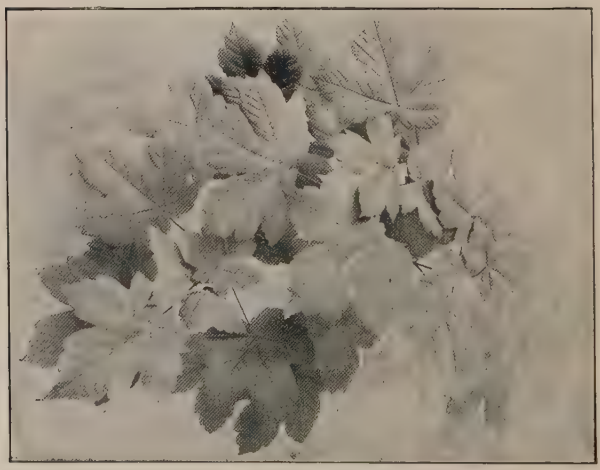
the earth. We naturally ask why the radicle should grow downwards and the stem, bearing its developing seed leaves, should grow upwards. The action is in part due to gravity, the upward and downward growth being in line with the direction of the force of gravitation. It has been suggested that downward growth is partly determined by the presence of small starch grains, called statoliths, in the cells of the growing root which sink to the floor of the cells and in some measure "weight" them. But it can hardly be contended that gravity, even when aided by statoliths, is sufficient to account for the phenomenon. When we add to these factors that of "inherited experience" we do but extend the mystery. Perhaps we might venture to assume that a vital urge is more potent than gravity.

Primarily the root is an anchor, a means of fixity in the soil. The growing plant must have a local habitation. It may be assumed that plant-life began in the water and that land plants were a later development. True water plants may attach themselves to some solid object, but the attachment is not that of an active root. It is a mere holdfast.

Aquatic plants have no difficulty as to water supply, but a land plant has to be devised so that it may obtain and conserve the water which is necessary to its existence. The land plant, so to speak, has to search for water, and the one source from which it gets it is the soil. In order to get water from the soil, the root, which as we have seen is primarily a holdfast, has developed delicate root-hairs which can not only absorb



EPIDERMIS OF MONKEY PUZZLE ("ARAUCARIA IMBRICATA") SHOWING STOMATA, OR BREATHING PORES. × ABOUT 100.



SYCAMORE LEAF-MOSAIC.

the requisite moisture, but also utilize certain salts which it contains in solution. Thus we see that the root first anchors the growing tree to the soil, and then, by means of fine root-hairs, absorbs necessary water and such nourishment in solution as is requisite for the welfare of the constantly growing tree.

The radicle develops into a tap-root which pushes its way downwards. The urge of growth determining the downward push is centred in a "growing point" near the tip. At this point the cell-division proceeds with great activity. The root-tip, which pushes deeper and deeper into the soil, and may have to negotiate rough gravel or rocky material, is protected by a sheath of hard-walled cells, which are incapable of serving any other use. They are subject to wear and tear, but as they wear away they are replaced by others of a similar nature produced from within. In most cases the tap-root ceases development after a few years; in the meantime a branched root system has been developed, the woody branches spreading horizontally in all directions. The grip of the tree on the earth is increased in rough proportion to the weight and strain of trunk, branches and foliage. While it is true that in a gale many trees are uprooted, the survivors are out of all proportion to the fallen. Generally speaking, the tree's anchorage in earth is sufficient to endure all possible strain.

The spread of a root generally bears close proportion to the spread of the leaf canopy overhead. One may shelter under a tree during heavy rain; it forms an ex-

cellent umbrella. While an occasional splash of water may fall within the covered area, the great bulk of the water gathered on the surface of the leaves falls in a circle of which the trunk is the centre. Within that circle the soil is comparatively dry, but outside it is laden with moisture. The roots reach out to the moisture, and thus, in the trees which throw the water away from the trunk, develop a spreading system proportionate to the extent of the leaf canopy. Another outstanding wonder of the tree is the rise of the sap. It is accounted for by root-pressure and a certain "draw" or suction established by evaporation of water from the leaves; yet when one considers that sap, whose chief constituent is water obtained from the earth, is raised through an elaborate system of tissues to the leaves of an Australian Eucalyptus which are situated upwards of 500 feet from the earth, one cannot but marvel at the precision with which the forces involved operate. And the marvel is increased by a study of the elaborate structure of the conducting system.

No tree can exist in its actively growing state without free circulation of the sap which is its life-blood. The moisture must not stagnate in the tissues; it must move and carry its burden of nutriment to all growing parts, and it must be continually renewed. The water from the soil is carried to the green leaves, where it is subjected to the action of the sun and from whence it escapes as water-vapour. The vents in the leaves, usually occurring on the under surface, are called stomata (Gr. *stoma*, a mouth). So circulation is

maintained. It is computed that an Oak tree, with about three-quarters of a million leaves, in the course of five months yields to the atmosphere upwards of a quarter of a million pounds of water.

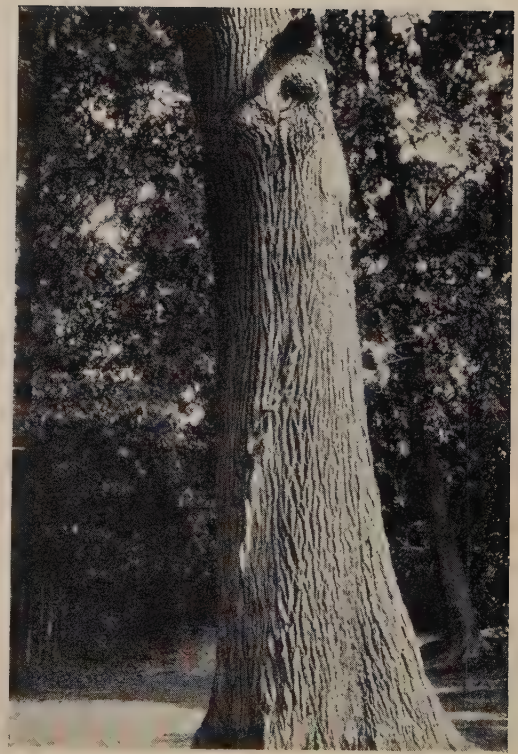
If the transpiration-current is to work successfully, the water supply and evaporation must be proportionate. Evaporation in excess of supply would be disastrous. Hence it is necessary that it should be controlled. The control is effected by what are known as guard-cells in connection with the stomata. These constrict and close the pores when it is necessary for the water to be conserved, but when water is plentiful they become swollen, and their turgidity so changes their size and form that the pores are opened to allow of the escape of the water-vapour. The stomata are very minute, and to observe them in detail a fairly high power of the microscope has to be used. In number they are legion: it has been calculated that there are about two million in an average Oak leaf.

It is impossible to overestimate the importance of the green leaf: no tree or ordinary green plant can function without its service. It is the abode of myriads of minute living protoplasts, which use it as a sort of chemical laboratory. They engage in chemical operations of such an elaborate nature as to be difficult to describe and even more difficult to imitate. Their work, in the main part, is rendered possible by the pigment known as chlorophyll, which gives the green tint to the leaf. The energy employed by these tiny chemists is obtained from the sunlight, and it seems

that the chlorophyll forms a screen by the aid of which the radiant energy of light is transformed into chemical energy. Mineral salts carried to them in solution from the soil, and carbon dioxide from the atmosphere, are materials utilized by the green leaf. Indeed, the green leaf is the laboratory in which plant food is manufactured both for immediate use and for storage.

Seeing that the protoplasts in the green leaf derive energy from the sunlight, it is essential that the leaves should be so arranged on the branches that no single one should unduly intercept the light which is needed by its neighbours. It may readily be seen that the leaves in their growth conform to this demand. The leaves at the ends of the branches form a mosaic.

Leaves are short-lived. They are in the height of their activity during the warmth of the summer, but when they are subjected to chills and the waning light of the autumn they can no longer serve. A certain degree of warmth and intensity of light is necessary to enable them to function. Nature has no use for that which does not contribute to its economy, and the tree must not be encumbered with useless appendages. Preparation for the autumn leaf-fall, or more properly leaf-casting, begins sometime before the event. A thin stratum of cork develops from the sides of the leaf-stalk at its juncture with the stem, and while this is growing the leaf, which has already passed the chief products of its chemistry into the body of the tree, begins to display autumn tints. The green pigment chlorophyll is gradually disintegrated, giving place to



Trunks of Silver Birch and Oak.

yellow or reddish pigments, which vary according to the species. Thus the autumn tints which are the delight of the artist are produced. In due course the stratum of cork extends right across the junction of the leaf-stalk and the stem, separating them at all points except where threads of woody tissue maintain a hold. At this stage the leaf hangs by a few threads. Finally the cork layer extends over the whole area and snaps the threads. A fairly conspicuous leaf-scar is left on the stem, but on examination it is soon seen that there has been no violent tearing, and that what might have been an open wound is neatly protected by a skin. Thus there is no open wound through which omnipresent bacteria or spores of parasitic fungi can get lodgment in the tissues of the tree. All through the summer buds are formed which remain unfolded until the following season. These buds contain neatly folded leaves, which by the end of the season are in an advanced stage of development. They are prepared for a quick burst into exuberant activity when the next season opens. The buds are protected by scales, and in some cases exudations of viscid substances.

Nature takes care that the fallen leaves serve a use. Their substance is converted into leaf-mould by the action of bacteria, fungi and protozoa, and thus it helps to form a humus which adds to the fertility of the soil.

All trees have their flowering periods. In many species the flowers are not spectacular, but in all instances the flower has relation to the propagation of the species. Pollen must be produced, which by some

agency will be conveyed to the receptive stigmas of female organs, in order that fertile seeds may result. In many cases male and female organs exist in the same flower, but in others they appear in separate flowers. Whatever the arrangement may be, there is usually some device to ensure that no flower shall be self-fertilized. It may be assumed that trees which produce flowers with attractive petals are pollinated by insects. Self-fertilization is prevented in flowers which embrace both male and female organs by the fact that when pollen is expelled the female stigma is not receptive. Thus the pollen of a particular flower, to be of use, must be carried by a visiting insect to another flower in which the stigma is receptive. It is commonly known that insects play an important part in carrying pollen from flower to flower. They are paid for their services with libations of nectar. Trees pollinated by insects include the Willows, and related Sallows, all of the Rose family, such as Pears and Apples; Laburnums, Acacias, Limes, Horse-chestnuts, etc. The Fig, which produces its minute flowers inside a receptacle which can be entered only by a narrow opening, is pollinated in a remarkable way by small wasps.

But in many trees pollination is effected by the wind. In such instances it is necessary for the male flowers to produce a vast quantity of pollen in order that, out of ejected clouds of it, some at least may chance to reach the stigmas of female flowers growing on other trees, or other parts of the same tree. Wind

is the pollinating agency in all cone-bearing trees (Pines and Firs), in Oaks, Beeches, Hazels, Alders, Poplars, Mulberries, Elms, Planes, Ashes and most Palms.

Where wind is the carrying agent for pollen the conditions provide that pollen is ejected only during light dry winds and generally at sunrise. If the air is still, or close and laden with moisture, or if there is rain, no pollen is ejected; it is reserved for more auspicious conditions. Further observation will probably reveal that each species has some peculiar arrangement for conserving its pollen. We have an instance of a remarkable device in this regard in the case of the Walnut. Before the male flowers of this tree are mature they occur crowded together in short thick spikes pointing upwards. But as the flowers develop, the stems on which they are crowded become elongated and limp. So instead of pointing upwards the inflorescences hang downwards, and the series of flowers are arranged each one facing a neighbour's back. The pollen is ejected in powdery masses, and these find lodgment in hollows of the envelopes of flowers immediately below. The pollen mass is held intact and safe until the right atmospheric conditions occur and there is a favourable light wind which will dislodge the mass and distribute its constituent pollen grains in the direction of the waiting female flowers.

Some note must also be made concerning seed-dispersal. It is, of course, essential that trees must spread themselves out, and should not crowd themselves out of existence. The progeny must, as far as possible,

colonize new territory. It is best that the seed should come to earth at a distance from the tree which produces it. It happens that the seeds of many trees are furnished with winged appendages which present surfaces to the wind, which more or less effectively disperses them. These appendages occur in forms varied according to species ; they are particularly noticeable in Sycamores, Ashes, Limes, Birches and Hornbeams. In the case of the Lime the seed hangs by a stalk from a single bract which acts as a parachute. Cotton trees, Poplars and Willows produce seeds surrounded by masses of silky hairs. So provided, they may remain poised in the air for a long time, being carried hither and thither with the variation of the breeze. Or if they come to earth they do so lightly and may be urged from place to place by a breeze before the filmy material in which they are surrounded decays and the seeds find final lodgment in the soil.

Animals also serve in the dispersal of seeds. Birds eat the fleshy parts of the fruit and toss the seeds aside ; or if a seed is swallowed, it may be disgorged or it may pass through the body of a bird without its vitality being destroyed. The woolly seed-masses of Poplars and Willows frequently become attached to the wool of sheep and other hairy animals, and these get carried considerable distances from the tree which produced them. A squirrel, with no altruistic end in view, but purely for its own benefit, may carry off and bury nuts which may be overlooked and thus be given opportunity for growth. Jays have their hiding-places in

which the fruits of the Beech, Oak and Hazel have been discovered.

It is significant that the fleshy parts of fruits are not tasteful to animals until the seed is ripe and ready for dispersal. Nature sees to it that her purpose shall be served, and seeds are protected in various ways with different species until they reach maturity. As an instance of such protection we note the Arolla Pine (*Pinus Cembra*). The cones of this tree exude a considerable quantity of resin until the seeds are ripe, and if birds or other animals attempt to get at the seeds while the cones are in such a condition they would be uncomfortably besmirched.

An interesting feature of a tree is its bark. This is an outer skin which is dead and is being constantly stretched by the formation of new bark beneath it. As the trunk increases in girth, this dead skin fails to stretch in proportion to growth and hence it cracks or peels off. A characteristic bark only appears after some years of growth. Bark is protective against heat or cold, and prevents evaporation of water from the trunk and branches. Bark is formed on Plane trees in the form of plates or shields which scale off under pressure of growth from beneath it. In the Common Birch the bark is membranous and is produced in thin sheets which separate like layers of paper and may be torn off in thin ribbons. In older trees the bark becomes corky. In the Oak, Lime, Ash and other trees the bark is deeply fissured owing to longitudinal rupture in a sort of zigzag course.

CHAPTER II

TREES NATIVE TO BRITAIN

In the plant kingdom there are two great groups—seedless plants and those producing seeds. Seedless plants include Algæ, Mosses and Ferns. Except in microscopic asexual species of Algæ, and in the Fungi, they reproduce by means of spores which are developed from the union of a minute male element with an ovum. Because the fertilizing process is not observable without the aid of a microscope, this group was formerly known as cryptogamic (hidden marriage). The spores do not contain an embryonic plant as in the case of seeds, and on germination they develop into a vegetative growth on which specialized cells are grouped to form organs productive of male and female elements. Some spore-producing plants have attained the stature of trees. Tree-ferns are examples.

The trees which will be described in this and the following chapter belong to the great group of flower- and seed-producing plants, and this group is naturally divided into two sections, Angiosperms and Gymnosperms. The Angiosperms (Gr. *angeion*, a case ; *sperma*, a seed) produce ovules enclosed in an ovary, and pollen is received on a specialized organ known as the stigma. In the Gymnosperms (Gr. *gymnos*, naked ; *sperma*, a seed) the ovules are not enclosed in an ovary ; they occur naked on exposed scales. In this group

there is no stigma and the pollen is received direct by the ovule, finding admittance at a particular point technically called the micropyle. The Gymnosperms include the cone-bearing trees—Pines, Firs, Larches, Cypresses, Junipers and Yews. These are the "soft woods" of commerce; "hard woods" are all Angiosperms.

The list of trees really native to Britain is a brief one; it includes less than forty species, and only three of these are Gymnosperms. In the following chapter we shall describe a number of species which have been introduced into this country and have become firmly established.

British Angiospermous Trees

Lime Trees (natural order Tiliaceæ).—Two species are considered to be native to Britain: first the Small-leaved Lime (*Tilia ulmifolia* or *parvifolia*) which flowers as late as July or August, and is long-lived, probably attaining five hundred years. It is found in woods and parks and is planted in avenues and gardens. The flowers are small, about $\frac{1}{3}$ inch in diameter; in colour, yellowish-white. They hang in clusters by a stalk attached to a pale-green leafy bract. Each flower bears an outer envelope of five sepals, an inner envelope of five petals which protect bundles of many stamens, and a spherical five-celled ovary surmounted by a five-lobed stigma. In any one flower the pollen is always mature before the stigma is receptive. The fruit consists of a small nut which is rounded or oval,

yellow, covered with soft hairs, and thin-shelled : it contains one or two seeds. The leaves are produced alternately on the branches. They are roughly heart-shaped and tapered to a point, with unequal sides. The margins are finely serrated. This species ranges in height from 20 to 100 feet. The branches have a somewhat erect habit, and produce drooping shoots. The bark is smooth and tough, in colour ashen-grey. Our second native is the Broad-leaved Lime (*Tilia platyphyllos*). It is indigenous in the west of England. The flowers resemble those of the preceding species. The fruit is woody, marked with three to five prominent ribs. The leaves are large, quite 4 inches across, thus easily distinguished from those of the previous species, which are not more than 2 inches across. Another distinguishing feature is the down which covers the under surface of the leaf. This tree may attain a height of 100 to 120 feet. Its bark is rough. But the Lime most commonly seen is *Tilia vulgaris*, probably a cross between the two species described.

Holly Tree (natural order Aquifoliaceæ).—Our native Holly (*Ilex aquifolium*) has such well-marked characteristics that it barely needs description. Its chief feature is its tough, glossy, prickly leaves, which persist for more than a year and fall during the summer, being then replaced so that the tree appears "evergreen." The flowers are inconspicuous, produced in masses between the leaf-stalk and the stem. Each white flower is about $\frac{1}{4}$ inch in diameter and sometimes is of one sex. Bees act as pollen carriers. The fruit

Holly Tree.

is fleshy, containing four seeds. When ripe it becomes bright red or sometimes yellow. The bark is smooth, pale grey. The wood is white and hard, and is used by cabinet-makers, particularly for inlaying. The Holly very frequently occurs as a shrub and is much favoured as a hedge plant ; but it occurs as a tree ranging from 10 to 50 feet in height. It grows slowly and attains a considerable age. Its use in Christmas decorations may indicate that in ancient times the Holly was venerated. Indeed, it is suggested that the name Holly has the same significance as the word "holy."

Spindle Tree (*Euonymus europæus* ; natural order Celastraceæ).—This species more frequently occurs as a shrub, but it is sometimes found as a tree up to 20 feet high. Its wood is tough and hard, and the English name indicates that formerly it was used for spindles. It is still used for skewers, and it produces excellent drawing-charcoal. The bark is smooth and of a greyish hue. The twigs have a fetid odour and grow opposite on the branches. The leaves are oval or broadly spear-shaped, short-stalked, with finely serrated margins ; they range from just over an inch to 5 inches in length and are smooth, glossy, yellowish-green ; they grow opposite to each other. From three to five flowers of a yellowish-green colour are attached on a loose bunch of flower-stalks, which emerge from the angle formed by leaf and branch, and are from 1 to 2 inches long. The fruit when ripe is a pale red, fleshy, four-celled capsule containing seeds

enveloped in a bright orange covering. The tree is sometimes attacked by large broods of the caterpillars of the Small Ermine Moth which consume the leaves.

Common Maple (*Acer campestre*; natural order Aceraceæ).—Out of more than one hundred Maples known to science the only one native to Britain is the Common or Field Maple. It is usually found in hedgerows where, being subjected to the clippers, it is reduced to a shrub-like form: but when permitted free growth it becomes a small tree which may attain a height of from 10 to 40 feet, with a thick trunk and a spreading crown. A characteristic feature is the bark which is brown, of a cork-like nature and irregularly fissured. The wood is soft. The leaves are palmate (*palma*, the palm of the hand), with five lobes and rounded teeth on the margin. They are from 3 to 4 inches across and attached to red footstalks. The autumn tints are yellow and russet. The flowers are green, about $\frac{1}{4}$ inch in diameter, and are borne in small, upright, divided clusters attached to short hairy branches known as pedicels, which emerge from the main stalk. The fruit is a "key" somewhat similar to that of the Ash. It consists of two seed cases which have fused. The wings are horizontal and in the late summer become red. The leaves are often seen with dark blotches caused by the action of a fungus known as Maple Leaf Blotch.

In the natural order Rosaceæ, the Rose family, there are a few natives which attain the dignity of

trees. They are of the genera *Prunus*, *Pyrus* and *Cratægus*. The genus *Prunus* includes the Plum, etc. The characteristic fruit in *Prunus* is a fleshy and usually juicy drupe—that is, a succulent fruit with a hard stone at its heart.

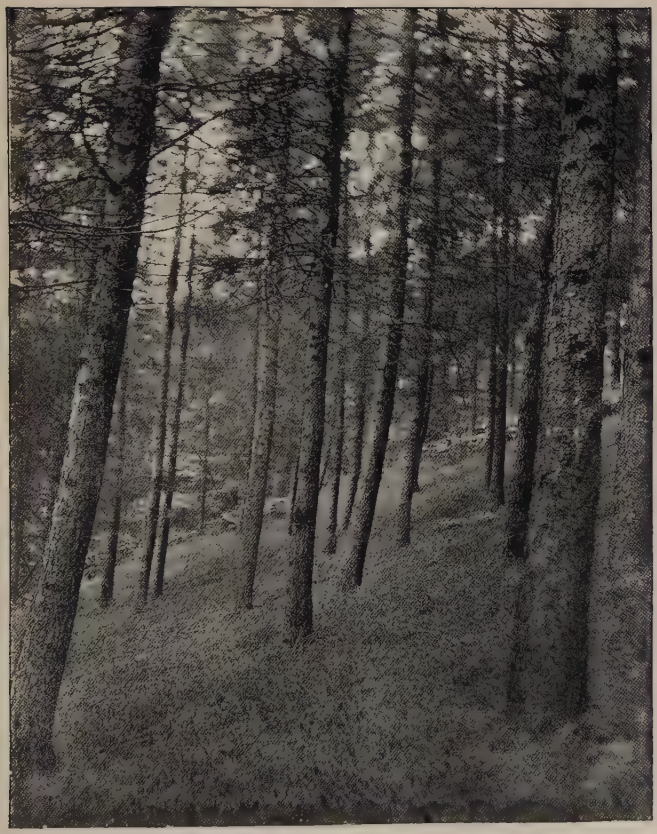
Bird Cherry (*Prunus Padus*).—Usually a shrub, but sometimes a small tree from 10 to 25 feet in height. The bark is smooth and grey. The leaves are oval, or ovate-spear-shaped, tapering to a point, and slightly heart-shaped at the base. They are smooth and thin in texture, doubly serrated on their margins, from 2 to 4 inches long. The flowers are white and are borne on the last year's wood in loose clusters which range from 2 to 6 inches in length. The clusters are erect before fertilization, but afterwards they droop. The fruit is $\frac{1}{3}$ inch in diameter, round, black and shining, with a bitter-sweet flavour. This species is native in various parts of Britain, but does not seem to occur in the south of England.

Gean-Tree (*Prunus Avium*).—This tree is considered by some authorities to be the parent of the Bigaroon, or Black-heart Cherry. It may attain a height of 40 feet. It occurs in copses and woods from Caithness to South Wales and the Midlands, and is known to grow in Yorkshire at 1,500 feet above sea-level. It produces short, stout, firm branches which are upward growing. The leaves are pale green, large, pendulous and broadly oval, the margins are sharply serrated, and the under surfaces are covered with soft hairs. The flowers are borne in flat clusters

(umbels); they are white, and over an inch in diameter. The fruit may be black or red. It is heart-shaped, and its not very abundant juice stains; it may be sweet or bitter to the palate. The timber is tough and reddish, and when polished resembles mahogany ; it is sometimes used in cabinet-making and for tool handles.

Wild or Dwarf Cherry (*Prunus Cerasus*).—Said to be the progenitor of Morello and Kentish Cherries. Found in copses and hedgerows from Yorkshire southward; differs in one point from the Gean in producing numerous suckers from the roots. Often a tree of considerable size up to 80 feet. Wood, fine-grained, reddish and often used for making cherry-wood tobacco pipes. The leaves occur alternately on the branches. They are oval or elongated-oval in form, shortly-stalked, tapering to a point and of erect habit. The flowers are white and are borne in bunches of two, three or more, on stalks from 1 to 2 inches long. The fruit is spherical, smooth, red or black, tart in taste, juicy, and its juice, unlike that of the Gean, does not stain.

Bullace (*Prunus institia*).—Considered to be native in England, but the point is open to question. Most often occurs as a considerable shrub. Distinguished from its close relative, the Blackthorn or Sloe (*P. spinosa*), which occurs as a shrub, by bigger leaves, more numerous white flowers which appear along with the leaves, those of the Sloe emerging before the leaves; the fruit also is larger, attaining about an inch in diameter. It has a spherical, smooth, black or



Larch Forest.

yellow fruit, and is considered to be the ancestor of plums cultivated in this country.

Crab-Apple (*Pyrus Malus*).—Our solitary native Apple. A tree found from Perthshire southward; it occurs as far north as Scandinavia and distributed over Europe, western Asia and the district of the Himalayas. The trunk has a crooked growth, bearing branches at first of a spreading habit, later drooping and producing a rounded crown. Height up to 30 feet. The bark is rough. Wood fine in texture and heavy, with a brownish tint ; polishes well. The leaves are placed alternately ; they are from 1 to 2 inches long, and at first are usually downy on the under surface. Their margins are serrated. The attractive flowers are white with pink streaks, about 1½ inches in diameter. They occur, five or six in number, as a stalkless umbel. The stigma matures before the pollen is ejected, and pollen is carried from flower to flower by insects. The apples are nearly spherical, about 1 inch in diameter, yellow or red when ripe, and exceedingly tart in flavour. The seeds are situated in five cells at the heart of the fruits, one or two in each cell. Flowering time, April-May.

Wild-Pear (*Pyrus communis*).—The numerous varieties of our cultivated Pears have been developed from this species. It occurs in hedges and woods, but is rather rare. Some botanists deem it to be an escape from cultivation, but good authorities own that it is native. The tree may attain a height of from 20 to 60 feet ; its shape is approximately pyramidal.

Flowering season, May-June. White flowers, over an inch in diameter, occur in clusters of six to ten on last year's wood. The stigmas ripen before the pollen. Flies are the chief pollen-carriers. The fruit is characteristically pear-shaped, with fleshy, gritty texture and a tough skin: length about 2 inches. It remains green till late in the season, but finally becomes yellow. Leaves alternately arranged on the fresh shoots, but crowded together on last year's wood; they are oval in shape, with tapering points, stalked, smooth, with bluntly toothed margins: length about 1¼ inches. Rough bark. Grain of wood fine. Wood of reddish tinge, sometimes used for cabinet work. The tree is subject to a number of insect pests and also suffers from fungi which attack the leaves. The species is distributed throughout the temperate regions of Europe and Asia. A variety (*P. cordata*) occurs in Devon, Cornwall and Hereford with leaves more fully oval and small fruit.

Mountain Ash (*Pyrus Aucuparia*).—An attractive tree found in woods and particularly on hillsides throughout Britain. It is cultivated in gardens. In the Highlands it is found growing at elevations up to 2,600 feet, but in high situations, where it is subject to storms, it becomes dwarfed and sometimes assumes a shrubby growth. The species has a wide distribution; it occurs throughout Europe, in north and west Asia and North America. It differs from the two species of *Pyrus* already described in having leaves which consist of leaflets arranged in pairs on an extended

midrib, with a terminal leaflet some distance from the last pair. The leaflets are narrow-oblong, from 1 to 1½ inches in length, paler in colour on the under surface, and with serrated margins. The cream-coloured, fragrant flowers, which are about ⅓ inch in diameter, are massed in flat heads from 4 to 6 inches across: they occur at the ends of short, leafy branches and appear in May and June. The fruit is of the apple type, but small, about ¼ inch in diameter: it is spherical. The fruits, like the flowers, are massed, and they make a brave show in September, when they are ripe and display coral-red or deep yellow hue. They provide food for thrushes and other birds. The flavour of the fruit is intensely tart : it is not uncommon in Scotland for the housewife to take advantage of this by adding some of the fruit to ordinary apples in making apple jelly. The tartness adds a fine "tang" to the product. This tree grows rapidly and is a good species to plant in new gardens. It reaches a height of from 30 to 45 or more feet. Its branches tend to grow upward, and the form of a well-grown tree becomes roughly conical. The bark is greyish and smooth. The wood is tough and elastic, and in the days of archery it was deemed to be next in value to that of the Yew for the making of bows.

White Beam (*Pyrus Aria*).—Native throughout Britain, but favours chalky soils : not frequent in Scotland. A fine tree found in woods and the margins of forests; a full-grown specimen may be 40 feet high, assuming a pyramidal form with stout trunk.

Bark, reddy-brown and smooth. Slender, ascending branches bear shoots covered with soft white cotton. Leaves oval, toothed, variable ; sometimes lobed ; from 2 to 6 inches long; bright green and shining on upper surface, covered beneath with mealy white down. It is the abundant occurrence of this down which gives the common name to the tree. Flowers appear in May and June. They are about ½ inch in diameter, white, and they occur in broad flat clusters at the ends of short, leafy branches. The clusters are covered with the white down which appears on other parts of the tree. The fruits are globular or ovoid and red: diameter ½ inch : they are ripe in September and are appreciated by birds. The fine-grained white wood is used for turnery.

Wild Service Tree (*Pyrus torminalis*), native in south and central England, where it occurs in woods and hedges, and found in southern Europe, west Asia and North Africa. Adapted to clay soil. Flowers in May and June, producing broad flat clusters of white blooms about ½ inch in diameter. When young, the clusters are enveloped in white down. The fruit, ripe in November, is about ⅓ inch in diameter, pear-shaped or nearly spherical, greenish-brown, dotted with corky spots. The leaves are long-oval or heart-shaped, broken into from 6 to 10 angular toothed lobes; they are about 3 inches broad and from to 2 to 4 inches long: the older ones are smooth on both surfaces, but the young ones are downy. The bark is grey and smooth. Wood reddish, fine-grained ; used for

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turnery and cabinet work; polishes well. This tree grows slowly and may attain great age. It reaches a height of from 40 to 50 feet. Sometimes occurs as a shrub.

Medlar (*Pyrus germanica*).—A doubtful native. Found wild locally in the south of England, but may be an escape from cultivation. Often shrubby, but also a small tree over 10 to 15 feet high. In wild state, the branches bear a few thorns. The simple leaves, which are lance-shaped with hardly any stalk, have finely serrated margins, and are slightly covered with down, which is thicker on the under surfaces. The white flowers are about 1½ inches in diameter : they grow solitary and stalkless on leafy twigs. The fruit is a sort of apple (pome), spherical, with a dented area at the top. The sepals of the flower persist and remain attached to the top of the fruit. The Medlar is native in Greece, Asia Minor and Persia. It is cultivated for its fruit, which is not really palatable until its rough flesh assumes a wine flavour through incipient decay.

Hawthorn (*Cratægus Oxyacantha*).—The genus *Cratægus* includes shrubs and small trees usually defended with strong thorns. It differs from *Pyrus* in its hard, bony seed cells. The Hawthorn is a familiar and beloved British species. Its fragrant flowers whiten many a hedgerow in May or June, and its dark-red fruits, "haws," brighten the autumn landscape, providing rich provender for birds. When clipped it becomes a shrub of dense growth and makes

excellent hedges. Allowed its freedom in wood, hedge, or garden it becomes a round-headed dense tree with smooth, grey bark which in old specimens becomes roughened and apt to flake. In some instances it reaches a height of 40 feet, but the average height will be about 20 feet. The flowers are white, sometimes pink, about ¾ inch in diameter ; they occur in broad flat clusters. The pollen-sacs (anthers) are pinkish-brown. The stigma is receptive before the pollen is ripe. Small flies serve as pollinating agents. The tree is attacked by the caterpillars of the Mottled Umber Moth, the Ermine Moths and others. The Hawthorn is also known as Whitethorn, and is commonly called "May" from its flowering month and its use in ancient May-day festivities. Now the flower-buds do not burst until later in the month, but that is not due to any alteration in the habit of the tree, but to the fact that since 1752 the calendar has been changed, causing May-day to be fully eleven days earlier. The Glastonbury Thorn, which legend saith was produced from the staff of Joseph of Arimathæa, and which flowers in midwinter, is a variety (*præcox*).

Common Elder (*Sambucus nigra*; natural order, Caprifoliaceæ), sometimes a small tree; usually a shrub which survives severe pruning. The wood of old trees is hard and is used for turnery work; but the branches abound in soft pith which is used in electrical experiments and for other purposes. Boys make pop-guns from shoots denuded of pith. Of yore they were made into flutes and pipes. An old tradition

declares that Judas Iscariot hanged himself on an Elder tree, and the prevalence of Elder hedges round sheilings in the Highlands of Scotland, where the Elder is called the Bour tree, illustrates an old superstitious notion to the effect that such hedges protected the houses from visits of evil spirits. The flowers are small, but they grow plentifully in cream-white, flattened clusters, 6 inches or more in diameter, making an attractive display in June. The clusters of fruits consist of small, round, fragrant, juicy purple-black berries, from which wine and cooling drinks may be prepared. The plant has some medicinal value. Leaves consist of four to eight leaflets in pairs and a terminal single leaflet. The leaflets are 2 or 3 inches long and are not pleasant-smelling. A native of England and Ireland, but well distributed in Scotland. Common in Europe, west Asia and North Africa.

Wayfaring Tree (*Viburnum Lantana*).—Also of natural order Caprifoliaceæ (Honeysuckle family). Usually a shrub, but sometimes a small tree, 8 to 20 feet. Favours chalk and limestone districts ; native in England from Yorkshire southwards ; naturalized elsewhere. Recognized by its many flexible, mealy branches and its mealy leaves, which are oval in contour and heart-shaped at the base—of a yellow-green tint, with veins prominent on under surface. The flowers are scented, white, and about $\frac{1}{4}$ inch in diameter. They are borne in crowded, flat clusters at the ends of the shoots. As the fruits, which are flattened berries, about $\frac{1}{3}$ inch in diameter, ripen, they change from

green to coral-red and finally to purplish-black. The bark in old trees is greyish-brown and fissured : it has an acrid taste. Found in Europe from Belgium southward; also in north and west Asia and North Africa. In Germany the pliant shoots are used in basket-making. Ink can be made from the berries.

Strawberry Tree (*Arbutus Unedo*).—A member of the Heath Order (Ericaceæ), native in south-west Ireland where it is a tree reaching to 40 feet, but more commonly seen where naturalized in the form of a shrub. It is a species of the Mediterranean region, associated with a Lusitanian flora which has reached south Ireland. Leaves evergreen, leathery, very dark green, glossy, short-stalked and alternately arranged, oval and pointed ; 2 to 3 inches long. The flowers are white or pinkish, urn-shaped, drooping in loose clusters. Fruit an edible berry about $\frac{2}{3}$ inch in diameter, red, many-seeded, clustered and resembling a strawberry: it takes over a year to ripen, and is seen on the tree in the company of a new generation of flowers appearing from September to October and even into November. The fruit produced in Britain is insipid and of poor quality, but the flavour is better when the tree grows in a more suitable climate. In Asia Minor it is in good demand and is marketed.

Ash (*Fraxinus excelsior*).—This attractive tree is a member of the Olive family (Oleaceæ). It is a true native and is common throughout Britain. Its grace of form and elegance of foliage have won for it the title

of the "Venus of the Woods." As a native timber-tree it is second in value only to the Oak. The wood is light, yet tough, strong and elastic, and it is largely employed by the wheelwright, the coach-builder, the turner, the tool-maker and agricultural implement manufacturer. The Ash is not so long-lived as the Oak: about two hundred years is its maximum, and it seldom attains a height of more than 80 feet. It is an "open" tree, giving no deep shade. The bark is grey, and as the tree matures it splits into deep fissures. The buds, almost black, occur in opposite pairs. The leaves open late in the spring: they may be over a foot long, and are divided into thin, smooth, pointed, opposite, almost stalkless leaflets arranged in three to six or more pairs, with a single terminal one. The leaf-stalk and the midrib are grooved. In the autumn leaf-fall, the leaflets break away from the stalk. The flowers break out from March to May before the leaves. They occur in dense clusters which spring from the axils of leaf-buds or young shoots, each cluster being surrounded by a few woolly scales. The cluster is composed of stalklets, each bearing a pair of pollen-sacs (anthers) and a central ovary produced into a style terminating in a thick stigma. The fruits are winged "keys" which hang in branches and on falling are dispersed by the wind. The tree does not fruit until it is about forty years old. Its wood is sometimes bored by the caterpillars of the Wood Leopard Moth and the Goat Moth. The old weather proverb has it:

" If the Oak is out before the Ash,
'Twill be a summer of wet and splash ;
But if the Ash is before the Oak,
'Twill be a summer of fire and smoke."

Elms (*Ulmus*, various species).—Elms contribute greatly to the richness of the English landscape and are so abundant that it is difficult to realize that most of the several varieties seen are not indigenous. Variations are numerous, and few can justly be elevated to specific rank. The Elms generally seen in our woods, parks and hedgerows may be described as lofty trees with erect, columnar trunks, attaining a height of about 125 feet and an age of five hundred to six hundred years. The bark is corky, rugged and fissured vertically. The species most common in Britain is the Common Elm (*Ulmus campestris*), an upright tree with tiers of spreading branches often festooned at their extremities. The leaves vary; they are pointed-oval, the half-blades not level at the base; the margins are toothed; the upper surface rough to the touch, and the under surface hairy; leaf-stalk short, arranged alternately on the branches. The ruddy flowers appear in closely packed clusters before the leaves, in March or April. The seed is surrounded with a flat membrane in which it is eccentric ; it rarely ripens in Britain, the tree being propagated from the abundant suckers which grow from the roots. The hard, tough, heavy wood has an irregular grain and is put to many uses.

Our truly native Elm is the Scots or Wych Elm (*Ulmus Montana*), which has larger leaves than *U.*

campestris. It is indigenous in Scotland, north and west England and Ireland, rare in south-east England. It may attain a height of 120 feet. The large branches spread from near the base. The trunk is not so upright as in the Common Elm. The roots do not produce suckers. The leaves are arranged alternately and have very short stalks; in form they are broadly oval, pointed; in size from 3 to 6 inches long by 3 inches across. Their margins are serrated ; the half-blades are unequal at the base. Flowers reddish, in crowded clusters protected by brown bracts or scales which are cast off at an early stage. Flowering months, March and April. Fruits ripened in June; they are green and leaf-like, ½ to ¾ inch long, notched at the top; seed almost central. Wood hard, straight in grain, used in boat-building, but not so good as that of *U. campestris*. Farmers and gardeners formerly took their cue for seed-sowing from natural signs. In Warwickshire the following ditty used to be current:

> "When Elm leaves are as big as a shilling,
> Plant kidney beans, if to plant 'em you're willing.
> When Elm leaves are as big as a penny,
> You must plant kidney beans if you mean to have any."

The natural order Amentaceæ includes the Birch, Oak, Beech, Hazel, etc., which produce flowers in the form of catkins. These catkins are cylindrical, oblong or rounded spikes of small flowers of one sex, each tiny flower protected by a scale-like bract. The most familiar example of the catkin is found in the Hazel, in which the long spikes of male flowers pro-

ductive of much pollen are very conspicuous in the early spring. In the Amentaceæ, catkins of both sexes grow on the same plant, but in the Salicaceæ, in which the Willows and Poplars are grouped, which are also catkinate, the sexes are on separate plants.

Silver Birch (*Betula Alba*).—The Birches are confined to the Northern Hemisphere and are well adapted to a northern climate. The present species, from its grace and elegance appropriately called the "Lady of the Woods," cannot thrive in southern Europe except at mountainous elevations. Climbing the Scottish mountains, one notices that it is the only tree which can endure the stress of existence on heights over 2,000 feet. This hardy native is found all over Britain, rendered conspicuous by its slenderness, its smooth, silver bark which peels in bands like paper, its thin branches and long leafy twigs. The catkins (both sexes in the same tree) open in April and May, before the leaves are full-grown. Male catkins, cylindrical, drooping, 1 to 2 inches long: they are developed at the ends of last year's shoots. Female catkins are shorter and are shortly stalked, about ½ inch in length ; they grow on small side-shoots and assume a nearly erect position. The fruit ripens in September or October ; it is a seed enclosed in a "key" with flattened side lobes. The small, glossy, toothed and pointed leaves, of a leathery texture, hang from slender stalks. The tree may reach 70 feet. The wood is yellow, fairly hard, of even grain and easily worked: it is employed in cabinet-work,

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AN OAK IN SPRING TIME

chair-making, and turnery. The twigs make good garden brooms, and the bark is used to tan skins. "Witches' Brooms" are frequently formed in the trees; they are confused masses of twigs suggestive of birds' nests and are peculiar growths in reaction to the attacks of a fungus. Hooker says the juice is sugary in spring, and a wine is made from it.

Dwarf Birch (*Betula nana*).—Usually a small shrub, but occasionally it attains 20 feet. It can hardly be called a tree. The male catkins are small, stalkless and erect; the females smaller still. The stem is wiry and creeping. A mountain species, found frequently in the Scottish Highlands, rarely in the north of England, and not known in Ireland.

Alder (*Alnus glutinosa*).—Commonly found in damp woods and by the sides of streams, in which locations it often produces more than one stem from its base. It prefers to keep its roots above the stream level. But the Alder is also found as a fairly tall tree, up to 70 feet. Of a dark, rather sombre hue and hardly picturesque; yet it often adds a touch of life in places where other trees do not flourish. Occurs throughout Britain, and stunted individuals are found up to 1,600 feet in the Scottish Highlands. Flowers greenish. The cylindrical, drooping male catkins, from 2 to 4 inches long, are formed in clusters in the autumn. Female catkins, closely packed and ovoid, appear in spring. As the latter mature their fruit, they become woody and black and bear some resemblance to a small fir-cone. The fruit is a nut containing a single seed

without wings. The leaves are shortly stalked, hairy and sticky when young, later smooth and shining above; very deep green, becoming brown, almost black at the leaf-fall. In form they are broad at the tips, rounded, tapering like a wedge towards the base; the margins are bluntly toothed. In old trees the bark becomes rough and cracked. Wood light and soft; in the living tree it is white, but when newly exposed to the air it becomes red; in a dry state, as seasoned timber, it is pinkish; sometimes termed Scots mahogany; used for poles, turnery, packing cases: soon perishes if treated to alternation of moisture and drought, but lasts remarkably well under water. Formerly in Scotland a green dye was extracted from the flowers, and a red dye from the bark. The species is found throughout Europe, in North Africa, and west and north Asia.

Hornbeam (*Carpinus Betulus*).—Native of Wales and central and southern England; planted elsewhere. Distributed over central and south-eastern Europe, reaching as far east as the Caucasus and north, to south Sweden. Often mistaken for a form of Elm or Beech. Common in the ancient forest of Epping. Sometimes used for hedges, flourishing even in hard, cold soils. A tree which may rise to upwards of 70 feet. Numerous short, slender, twiggy branches. Trunk often flattened and twisted; may be 10 feet in girth. Smooth, grey bark. Leaves from 2 to 3 inches long, shortly stalked, ovate, pointed, double-toothed on margin, veins running parallel from the midrib, somewhat

downy underneath; withered leaves of clipped hedges remain attached through the winter. Flowers of a yellowish hue, both sexes on the same tree. Male catkins, 1½ inches long, stalkless and drooping; about twelve stamens under each scale, with forked pollen-sacs, each sac crowned with tufted hairs. Female catkins, loose, from 2 to 4 inches long, with lobed, leaf-like scales, flowers in pairs; erect in flower, drooping in fruit. The fruit is a nut, ribbed, containing one seed; it is carried by a leafy three-lobed scale. Fruits clustered. Wood tough and hard, yet light and pliable; yellowish: employed in making charcoal for gunpowder, for pianos and farm tools. Gerard says of the Hornbeam: "It is better for arrows and shafts, pulleys for mills, and such like devices, than elme or wich hasell; for in time it waxeth so hard, that the toughnes and hardnes of it may be rather compared unto horn than unto wood: and therefore it was called hornbeam or hardbeam."

Common Hazel (*Corylus Avellana*).—Found in hedges, copses and woods. More often a shrub than a small tree of about 20 feet. Both sexes on the same plant, and the flowers always mature before the leaves break out. Male catkins greyish-green, drooping, up to 2 inches long; female catkins inconspicuous, like tiny leaf-buds with protruding crimson stigmas. The fruit is a brown nut (hazel nut) enclosed in a leafy cup. Fruits clustered. Bark on the young branches hairy and ashen; on old stems, mottled grey and shining brown; splits readily. Leaves orbicular, unevenly

heart-shaped at the base, pointed and double-toothed, from 2 to 4 inches in length. Leaf-stalk short. Wood reddish, soft and pliable, used for barrel hoops. The use of a forked Hazel rod to indicate the location of metals and water is superstitious, but at one time the "dowser" was much encouraged. Johns says: "The professor of this questionable science selected for this purpose a forked Hazel-rod (called a dowsing rod), a branch of which he held with each hand in front of his chest, with the other end slightly pointing outwards. He then walked forward over the ground to be examined, and when he reached a spot under which lay a lode or mass of metal, the end of the rod, in spite of his utmost efforts to restrain it, bent down and pointed towards the buried mineral." In Evelyn's time the alleged occult virtue of the dowsing rod was extended to the detection of murderers. The Hazel is abundant throughout Europe and central Asia, except in the extreme north. The fruit is attacked by the Nut Weevil: it provides food for squirrels and nut-hatches. The wood is attacked by the caterpillars of the Wood Leopard Moth.

British Oak (*Quercus Robur*).—A long-lived tree, some individuals possibly 2,000 years old. Common in most of England, the Scottish lowlands and Ireland. Height up to 100 feet or more. Branches spreading and angled, forming "knee" wood, useful in shipbuilding. Trunk extending to a considerable girth; 70 feet in the case of the Cowthorpe Oak, Yorkshire. Bark dark, rough, becoming thick and splitting into

Wych Elm: Summer and Winter.

reticulate fissures; used in tanning. Leaves generally fall in the autumn, but in some varieties, especially in young trees, some withered leaves remain attached through the winter. The leaves are shortly stalked, with sinuous margins, sometimes almost lobed; when mature they are of a leathery texture; from 3 to 6 inches long by 1 to 2½ inches broad. Male and female flowers appear at the opening of leaf-buds on the same tree. Male catkins slender, drooping, usually with breaks between the flowers, giving the appearance of a stalk bearing separated flower-clusters: length 2 to 3 inches. Female flowers borne singly or in small clusters on long stalks produced from axils of upper leaves. The fruit an acorn placed in a little cup composed of fused scales: it is borne on a fruit-stalk 1 to 6 inches long. The tree does not bear fruit until it is over fifty years old.

A variety considered by some authorities to be a distinct species is the Sessile-Flowered Oak (*Q. Sessiliflora*). It differs in having well-stalked leaves, stalk ½ to 1 inch long, and a very short-stalked (almost sessile) acorn. The wood is heavier, darker and more pliable than that of *pedunculata*. This variety is abundant in the Forest of Dean; it is commoner than *pedunculata* in north Wales and the hilly ground of northern England.

The Oaks provide subsistence for the grubs of numerous insects; indeed, it has been computed that about 1,500 species batten on it. So-called "Oak-apples" are galls produced by vegetative reaction to

the grub of the Gall-fly, *Teras terminalis*; Artichoke Galls are developed from buds attacked by the fly *Aphilothrix fecundatrix*. Oak spangles are flat discs attached to the under surfaces of the leaves. They are outgrowths due to the operations of the grub of a Gall-fly dignified with the name *Neuroterus lenticularis*. The fungus called the Vegetable Beef Steak (*Fistulina hepatica*) is sometimes found on dead Oak wood.

Beech (*Fagus sylvatica*).—A truly noble tree concerning which imaginative observers are eloquent. Gilbert White penned his admiration of it in few but forceful words: "The most lovely of all forest trees, whether we consider its smooth rind or bark, its glossy foliage, or graceful, pendulous boughs." Pliny, the Roman naturalist (born A.D. 23), wrote of it: "Of the various kinds of mast, that of the Fagus is the sweetest, on which Cornelius Alexander says, that some men who were besieged in the town of Chios, lived for some time. It resembles a nut and is enclosed in a triangular rind. The leaf is thin and exceedingly smooth, shaped like the poplar, decaying after it has fallen to the ground, long before any of the other mast-bearing trees. The mast is much eaten by mice, which abound at the season of its ripening; it also entices dormice, and is much sought after by thrushes. Hogs fattened on it are lively, and their flesh is digestible, light and wholesome. The bark is used for making baskets and panniers, but the timber is not durable." One of the most eloquent passages in Rev. C. A. Johns' "Forest Trees of Britain" concerns this tree. He writes:

" It is a tree which has many points of interest about it at all seasons of the year. Enter a grove of Beeches on a bright day in midwinter: the mind is immediately engaged in meditating on the still solemnity that reigns around. Look where you will, Nature is in a state of deep repose, if not of suspended animation: there is as little semblance of growing life as in the cloisters of a cathedral. The ground is bare of everything save withered leaves and dead twigs and wrinkled husks: every herb, if any ever grew here, has hidden itself under the brown covering of the earth, as if afraid to show signs of life in that universal solitude. As far as the eye can reach, on all sides extends an irregular succession of lofty, fluted columns, which seem to have been chiselled to their existing proportions; for nowhere is there to be detected a single rugged trunk indicative of expansive growth, nor one to which the mantling Ivy imparts a borrowed semblance of vitality. . . . Yet there is no gloom here, for the sun, as if aware that this is the only season at which his rays can penetrate these recesses, makes up in brightness for what he wants of heat."

The Beech is found throughout temperate Europe, and in parts of the Continent there are large areas of almost pure Beech forest. It is native in England, on chalk and limestone soils, but it has been planted throughout Britain and thrives on almost any soil. It lives from two hundred to three hundred years and reaches a height of fully 100 feet. When planted in open spaces it forms spreading branches from near its

base and its broad crown provides good shelter. When growing in the near neighbourhood of other trees, it shoots up to the light, branching towards the summit, and thus develops a tall, naked trunk which, with its leaden grey, smooth bark, and columnar growth, easily arrests the eye. The leaves are a long-oval, drawn to a point at their tips, shortly stalked, sometimes slightly toothed; when young, silky, but later smooth and shining. In the spring they are as attractive for their bright green colour as they are in summer for their lustrous deep-green hue. In autumn the leaves become yellow, gold, purple, and latterly a warm brown. The flowers develop contemporaneously with the leaves in April and May. The male flowers occur in globular, drooping catkins attached to thin stalks about 1 to 2 inches long; the female occur two to four in a shorter and stouter-stalked erect catkin. The fruit consists of two or three three-cornered nuts enclosed in a bristly, woody, brown capsule of four valves; it is the "mast." The wood is brownish, close in grain, hard and somewhat brittle: it is put to various uses.

The Beech is used for hedging, and in clipped beech hedges the withered leaves, or many of them, remain attached to the twigs through the winter. The name "Beech" is from the Anglo-Saxon *bece*, from which we have the German *Buche*. Johns says: "The wood of the tree having been formerly used for forming the sides of books, the word 'book' came to be applied to the volume itself."

In the natural order Salicaceæ are grouped the

Sutton Palmer, R.I.

Willows, Sallows and Poplars. The sexes are represented on separate plants and the flowers are in catkins which generally develop before the leaves. The small seeds, being furnished with a pencil of long, white, silky hairs, are readily distributed by the wind.

Bay-Leaved Willow (*Salix pentandra*).—Occurs as a shrub and also as a small tree up to 20 feet high. Recognized by its dark green, shining leaves, which somewhat resemble those of the Portugal Laurel; they are rather variable in outline, but generally are broadly oval, pointed, and finely toothed on the margin. They have a yellow midrib, and a fragrance similar to that of the Laurel. When young they are sticky; they are thicker, smoother and more lustrous than those of any other species. The dense, cylindrical, shortly stalked male catkins, about 1 to 2 inches long and nearly $\frac{3}{4}$ inch in diameter, are erect in growth; the female catkins are a little smaller. This is the latest-flowering of our Willows (May-June). It flourishes best by streams and in damp woods, particularly in hilly areas. Native in north Wales, southern Scotland, north England and the Midlands. Extends over Europe, temperate Asia to the Arctic regions.

Crack Willow (*Salix fragilis*).—Known also as the Withy. Called "Crack" Willow because its shoots are very easily snapped off at their base. Distributed over Europe, northern and western Asia on damp ground; found in Britain from Ross southward, also in Ireland and the Channel Islands; but considered to be native only in England. This tree may attain a height

of 80 or 90 feet and develop a trunk up to 20 feet in girth. The bark is thick, rugged and deeply furrowed. The branches spread obliquely. The new shoots are brownish, polished, smooth and flexible. When young the leaves may be slightly silky, but in maturity they are smooth; pale or bluey-green beneath; lance-like, pointed, from 3 to 6 inches long, with toothed margins. Stipules—*i.e.*, small leaf-like outgrowths—occur at the bases of the leaves. The trees are unisexual, and the catkins develop at the same time as the leaves. Male catkins are stalked, stout, and have a spreading habit; they are 1 to 2 inches long, in colour yellowish-green. Female catkins are more slender and slightly longer. Flowering season, April-May. The fruit is a smooth, stalked capsule, tapering at the top. The wood is tough, light, pliable and of a lasting quality. When first cut " the sap-wood is white, the heart-wood pale red; upon exposure to the air, and when seasoned, both become of a fine salmon colour " (Johns). A purplish dye can be extracted from the roots.

White Willow (*Salix Alba*).—Grows in marshy places, wet meadows and by streams throughout Europe and temperate Asia, except in the extreme north; common in Britain. May become a large tree, from 70 to 80 feet high and up to 20 feet in girth. The foliage is whitish or ash-grey, and the young twigs are green, bright yellow or purplish. The leaves are narrowly lance-like, drawn to a point at the tip and toothed; at first silky on both sides, smooth later and never brightly green. Sexes on different trees. Male

catkins up to 2 inches long and ½ inch in diameter; cylindrical, loose and almost stalkless; growing erect on leafy outgrowths from shoots of the previous year. Female catkins also erect; longer and less in diameter than the males. Fruit a smooth, sessile or almost stalkless capsule, tapering shortly at the top. Flowering season, April-May, the catkins developing with the leaves. The bark is thick and fissured. Unlike *S. fragilis*, the flexible shoots are not readily snapped off. Cricket-bats are made from the wood of this species. It is much favoured by the Goat Moth, the larvæ of which bore the growing timber.

Almond-Leaved, or French Willow (*Salix triandra*).—A tree of the river-banks and marshy places, with bark which flakes. A doubtful native of Scotland and Ireland. Never attains any considerable height; perhaps 20 feet; sometimes a shrub-like growth. Like the Osier, when the stumps are cut down it produces long, flexible shoots which are used for basket-work. Leaves long and narrow, with parallel edges, or shaped like a long, fairly broad spear; drawn to a point at the tip, toothed, smooth, almost leathery in texture; upper surface green, blue-green beneath; length up to 4 inches; outstanding midrib. Trees unisexual, flowers yellow and appear at the same time as the leaves. Catkins oblong-oval, slender, stalked; male 1 to 3 inches long, female slightly shorter and narrower: the stigma is stalkless. The fruit is a smooth, two-valved, stalked capsule. The twigs are smooth and snap easily above the joints. The specific name

triandra (Gr. *treis*, three; *aner*, a male) refers to a distinctive feature of the male flowers, each of which bears three long stamens crowned with golden pollen-sacs, or anthers.

Goat Willow or Common Sallow (*Salix Caprea*).—Occurs as shrub, but may be a bushy tree from 10 to 30 feet high. Found in thickets, woods and hedges and by stream-sides through Europe, north and western Asia, and in the Himalayas. In Britain, common from Argyllshire and Inverness southward. In the Highlands it is found in marshy places among mountains up to 2,000 feet: flourishes well by the sea. This is the species of Willow from which "palms" for Palm Sunday celebrations are gathered, and it provides welcome food for bees and early moths during its flowering period, April-May. The stem is erect; the branches are purplish and the new twigs are covered with fine down. As in other Willows, the sexes are on separate trees. The flowers develop before the leaves. The catkins of both sexes are stalkless and of stout growth; the male up to 1½ inches long, silky and golden; the female lengthens to 3 inches. Leaves 2 to 4 inches long, oval or oblong, not often tapering at the top, greyish-green above, whitish beneath with crisp down, somewhat wrinkled. The fruit is a downy-white capsule somewhat less than ½ inch long. This is the earliest flowering British Willow.

Grey Sallow (*Salix cinerea*).—A tree of 20 to 30 feet, by some authorities considered to be a subspecies of *S. Caprea*. Found in similar situations, but the

leaves smaller and the catkins not so stout and silky. Flowers April-May, but later than in *S. Caprea*, and there is usually a second flowering in September. Buds woolly-haired; leaves elliptical-oblong, softly-hairy above, not woolly-haired, and often blue-green beneath.

The Willows are variable and subject to hybridization. Specialists have distinguished many varieties, but in so limited a book as this, there is no space for description of variations concerning which authorities differ. I have confined myself to Willow Trees that are British natives and of definite specific rank. No mention has been made of Willows which occur entirely as shrubs.

But we cannot finally leave the Willow without reference to its association with sadness. Fuller says: "The Willow is a sad tree, whereof such as have lost their love make their mourning garlands." "Wearing the Willow" is an old saying equivalent to going into mourning, especially for a sweetheart or a bride. In *Othello*, Shakespeare makes Desdemona say in anticipation of her death:

> "My mother had a maid called Barbara:
> She was in love, and he she loved proved mad
> And did forsake her; she had a song of 'willow';
> An old thing 'twas, but it expressed her fortune,
> And she died singing it: that song to-night
> Will not go from my mind."

It seems highly probable that this association of the Willow with mourning originated with the Psalmist,

who, in the 137th Psalm, tells of the Jews captive in Babylonia refusing to sing the songs of Zion in a strange land, and, as a sign of sadness, hanging their harps on Willow trees.

But the branches of the Goat Willow bearing catkins are called "palms," and are used in joyful celebration of Palm Sunday. Is this because true palms are not available in Britain, the Willow being used instead? Not necessarily so, for it would seem to have some authority in the directions given to the Israelites concerning the institution of the Feast of Tabernacles. In Lev. xxiii. 40 we read: "And ye shall take you on the first day the boughs of goodly trees, branches of palm trees, and the boughs of thick trees, and willows of the brook; and ye shall rejoice before the Lord your God seven days." The name willow is from the Anglo-Saxon *welig*, which has reference to pliancy. The Anglo-Saxon name shows that anciently the Willow was specially respected for its pliant shoots used in basket-making and wicker work.

In the genus *Salix* (the Willows) the catkin scales, which protect the flowers, are "entire"—that is to say, their margins have no teeth or other indentations; in the genus *Populus* (the Poplars) the catkin scales are jagged. The catkins of the Willows are usually of erect growth, whereas in the Poplars they droop. It is thought that the name Poplar (*populus*) is an indication that the Poplar, in the revolutions in Rome and France, was regarded as the tree of the people. But it has been suggested that the name is derived from

a Greek word meaning "to tremble," this having reference to the familiar tremulous movement of the leaves.

White Poplar (*Populus alba*).—A tall, handsome tree up to 100 feet high, flourishing best in open damp woods and by streams. Very generally planted in Britain, and probably a native, although the point is questioned. Found scattered over central and southern Europe and temperate Asia. The bark is ash-coloured or light grey; the branches spread with an ascending tendency; the young shoots are covered with a white cottony growth of rather close texture. The leaves tend to vary in form; from 1 to 3 inches long and about 2½ inches broad; the leaf margin is wavy; the upper surface is smooth, but the under surface is white on account of a cottony growth similar to that on the young shoots. The flowering period is March to April. The catkins appear at the ends of small shoots, the sexes on separate trees. Pollination is effected by wind. Male catkins cylindrical, pendulous, from 2 to 4 inches long. They have no stalks and they fall easily. Female catkins shorter and denser. The seeds are small, oval in form, black in colour, and each bears a tuft of silky hairs; they are mature about June; the roots are prolific in the production of suckers. The White Poplar is a quickly growing tree, attaining maturity in fifty or sixty years, but surviving longer. Probably owing to rapid growth, the white wood is soft and light; it does not burn readily. It is used in general carpentry. Anciently it was employed in the

making of shields; it was valuable for such use because it yields before a blow and is not easily split by nails. The tree is suited for growth in smoky towns, and this, possibly, is accounted for by the cottony covering of the under surfaces of the leaves, which will prevent the stomata from being clogged with soot.

The White Poplar has its place in mythology. Hercules is said to have won one of his triumphs in a locality in which the tree abounded, and in commemoration of the victory was wont to wear a wreath of its leaves. Folk who venerated Hercules and offered sacrifices to him wore similar wreaths at festal celebrations. This tree is also called the Abele, a name supposed to be from the Dutch *Abeel*. The caterpillars of many moth-species feed on the leaves, and the wood is bored by the larvæ of the Goat Moth.

Grey Poplar (*Populus canescens*).—Very similar to the previous species, and supposed by some to be a subspecies, or a hybrid. Certainly a native in southern England. The leaves are different, being roundly heart-shaped, thin, toothed, waved and not always covered with cotton beneath. The leaves of fresh suckers are cut and toothed. Shoots and buds downy.

Aspen (*Populus tremula*).—Smaller and of slower growth than the two previous species, height up to 60 or 70 feet. Found in damp woods and other moist situations through north Europe and northern Asia. Native throughout Britain; often planted. Found at considerable elevations in Yorkshire. More common in Scotland and Ireland than in England. A short-

G. S. Elgood, R.I.

OLD OAK AT SWINFORD OLD MANOR, NEAR ASHFORD, KENT

lived tree, with slender, spreading branches and producing downy, frequently reddish shoots. The buds are downy, but not sticky. Produces many downy root-suckers. The leaves are small, nearly round in general form, up to 1 inch broad, margins with teeth curving inwards, thin, the under surface being smooth, frequently pale, but never downy. The leaf-stalk is long, very slender, compressed, so that the blade trembles and the tree rustles with the slightest breath of air. This peculiarity gives rise to the saying, "Trembling like an aspen." The sexes are on different trees and the catkins are barely-stalked, dense, cylindrical and curved—2 to 3 inches long. The fruiting catkins extend to upwards of 5 inches. The bark is smooth and greyish. Wood white, soft and not highly valued, except for paper pulp: burns rapidly; the life of the tree is at its height in fifty years, and after that its heart-wood decays.

Undaunted by the fact that the trembling of the leaves of the Aspen is due to a cause already explained, some of the superstitious, who are satisfied with nothing less than miracles, attribute the phenomenon to an unfounded idea that the cross on which Jesus was crucified was made from the wood of this tree, and they allege that reason for the almost constant rustling of the leaves. A German legend has it that the Holy Family came to a forest during the flight into Egypt, and, as they approached, all the trees but the Aspen bowed in reverence. The pride of the Aspen was observed by the Holy Child, who, in an angry petulance we do not

associate with His character, at once cursed the tree, causing its leaves to tremble, and since then the trembling has been unceasing. The legend is referred to in these verses:

> "Once as our Saviour walked with men below,
> His path of mercy through a forest lay;
> And mark how all the drooping branches show
> What homage best a silent tree may pay.
>
> "Only the aspen stood erect and free,
> Scorning to join the voiceless worship pure.
> But see! He cast one look upon the tree;
> Struck to the heart, she trembles evermore."

The old herbalists saw in certain characteristics of plants signs of the diseases for which they were supposed to provide an antidote. Because the Aspen leaves trembled, they came to the conclusion this action indicated it as a specific for the ague.

British Gymnospermous Trees

The Pine Family (Natural order, Coniferæ).—This family consists of shrubs or trees which in most cases are resinous. The leaves are stiff, with untoothed margins, narrow, with parallel margins, or awl-shaped, or scale-like. The sexes may be on the same or separate plants, occurring as catkins with closely packed scales; in unusual instances the female flowers may be solitary. The male organs (stamens) either spring from the axis of the catkin within the scales, or stalkless pollen-sacs (anthers) may be borne on the inside of the scales. The ovules and seeds are always naked, as described on p. 18. In Britain there are

only three really native gymnospermous trees, each belonging to a separate genus: they are the Yew, the Juniper, and Scots Pine.

Yew (*Taxus baccata*).—An evergreen tree of dark, sombre mien, never tall, ranging in height from 15 to 50 feet, and very long-lived, perhaps exceeding the Oak in age. Native in hilly areas of England, south Scotland and north Ireland; distributed over Europe, north and central Asia and North America. Trunk short, thick, up to 27 feet in girth or more, giving the impression of clustered columns—this being due to the fact that the tree pushes out shoots from its trunk; these grow upwards and become fused together, so adding to the girth of the bole and producing the columnar effect. The bark is reddish and thin, and the old bark falls off in flakes. The leaves are of a leathery texture, varying from ½ to 1½ inches in length, flat, narrow, parallel-sided and pointed; they are dark-green and lustrous above, paler beneath; although they spring spirally from the shoots, their short stalks take a half-turn, so that the blades lie in opposite ranks on the twigs in one plane. The sexes are generally on separate trees, but, rarely, both may appear on one tree. Catkins are very small; the male in the axils of the leaves are practically little bunches of stamens with from three to eight pollen-sacs; the female is a solitary, upstanding ovule seated on a small, fleshy, cup-shaped disc; it is produced from the sides of branches. When the fruit is ripe it consists of a hard seed seated in a succulent, red, fleshy integument, which is sweet to the taste and

appreciated by birds, which, in eating it, help to distribute the seed. The leaves are poisonous. The wood is hard and elastic. The flowers are mature in February or March, and at that time the shaking of a branch will produce clouds of pollen.

The Yew is famous in history as the tree yielding the best material for bows used in archery. Formerly it was planted in churchyards, and this was undoubtedly for some real use, although there is divergence of opinion as to what the use was. Some think the object was to provide a supply of material for long-bows, but others are of the opinion that it was grown to supply branches which at one time were carried in processions on Palm Sunday. One old writer indicates that the sombre tree had some association with funerals, and he suggests that the churchyard Yew was preserved to yield branches for funeral processions, the branches being carried by the mourners, and finally thrown into the grave. Another has it that the Yew, being so long-lived, was grown in the kirkyard as a symbol of immortality.

Shakespeare betrays an old custom with regard to the Yew in " Twelfth Night ":

> " My shroud of white, stuck all with yew,
> Oh, prepare it :
> My part of death, no one so true
> Did share it."

Broken-hearted lovers, in olden times, often had wreaths of Yew, Willow, and Rosemary laid on their biers. There is a reference to this in an old ballad:

Scots Pines.

"Lay a garland on my hearse
Of the dismal Yew;
Maidens, willow branches bear—
Say I died true.
My love was false, but I was firm
From my hour of birth.
Upon my buried body lie
Lightly, gentle earth."

The superstitious say that if one dreams of Yew it portends the death of an old person who will leave great wealth.

The wood of the Yew, in addition to being tough and elastic, is very durable, and it is claimed that palings made of it will outlast those made of iron.

Avenues of old Yew trees are found in various parts of the country; the spreading branches often meet, and the dense, dark foliage forms a canopy through which the sunlight can hardly penetrate. While all is brightness without, under the trees there is cool shade and twilight gloom. One such avenue is to be seen at the clachan of Rosneath in Dumbartonshire.

Juniper (*Juniperus communis*).—More frequently a shrub, but may occur as a tree of 10 to 25 feet. Native in Britain, but commoner in the north than in the south. Found principally on arid hills and downs, even up to an elevation of over 2,000 feet. The leaves grow in whorls of three; they are awl-shaped, stiff, green beneath, blue-green above, so sharply pointed as to be prickly; about ½ inch long; when crushed they produce an aromatic fragrance. The bark is ruddy and fibrous; it falls off in flakes. Male flowers solitary, or in very

small clusters in the axils of the leaves; the stamens are many, with three- to six-celled pollen-sacs which yield abundant pale yellow pollen. Female flowers also in axils of leaves, they are composed of three to six fleshy scales with one or two ovules beneath each, with some barren scales at the base. The fruit is a fleshy blue-black berry about the size of a pea. The dwarf Juniper (*J. nana*) is an alpine variety found at high elevation in the north of Wales, Scotland and the English Lake District. *J. communis* is distributed through Europe and occurs in northern Asia and America. The berries have been used as a spice, and in some localities are roasted and used as a substitute for coffee. The fragrant wood and berries are said to have been used in Sweden for the fumigation of sick-rooms. The principal use of the berries is for flavouring gin, known as Hollands or Geneva. They are used medicinally as a kidney stimulant.

The old dream-books say that the Juniper is powerful in dreams. It is unlucky to dream of the tree itself, especially if the person be sick; but to dream of gathering the berries, if it be in winter, denotes prosperity. To dream of the actual berries signifies that the dreamer will shortly arrive at great honours and become an important person. To the married it foretells the birth of a male child. "In Italy a sprig of Juniper used to be placed on the doors of stables with the notion that it was a protection against demons and thunderbolts; and on the Continent the plant is still venerated because tradition says it saved the life of the Madonna and Child

on the flight into Egypt: on that account it has been peculiarly blessed with the power to destroy magical charms and the machinations of evil spirits.

Scots Pine (*Pinus Sylvestris*).—Planted all over Britain and naturalized. Certainly native in the Highlands of Scotland, and the discovery of trunks in peat bogs shows that formerly it was native in England and Ireland. A species dispersed over north and central Europe and northern Asia. In southern Europe, only on mountainous elevations. A northern tree which thrives best in peaty soils, its growth there being assisted by the nutritive activity of the hyphæ of associated root-fungi (Mycorhiza) which, from once being parasitic enemies, have been turned to account. A tree of some size, reaching 50 to 100 feet, with trunk 12 feet in girth. Said to be capable of living 500 years. As a young tree, the form is conical, but later it loses its lower branches, the trunk becoming very bare in many instances, and the crown becomes flattened. Then it is that the tree stands out characteristically in the landscape, its reddish-brown, smooth bark on its branches, and its ruddy, rugged bark on the trunk, conspicuous in the sunlight. As the tree ages, deep longitudinal fissures appear on the thick bark of the bole, and flakes of surface bark fall to the ground. The leaves are seldom more than 2 inches long; they grow in pairs on short shoots and are sheathed at the base by short, chaffy scales; they are pointed "needles," grooved on the upper surface and convex underneath. In the first year of growth they are blue-green; they

become dark green in the second year, and they fall in the third. As there is a succession of new leaves, the tree is evergreen. Male and female flowers appear in May or June on the same tree; the male occur in oval spikes about ½ inch long at the bases of young shoots; the female catkins appear like small reddish buds, usually in pairs, at the extremities of fresh shoots. Pollen is shed in clouds, and the tiny grains are held in suspension in the air by means of microscopic air sacs, two of which occur on each grain. When the ovules are successfully pollinated, the cones in which they are contained, being at first erect, turn downwards slowly until, in about eighteen months, the seed is ripened. The cone is egg-shaped, marked with "lozenge" patches, the lozenges being the curiously developed apices of the cone-scales. In its final stage the cone, green while growing, becomes woody; the scales break apart and liberate the seeds, each of which is furnished with a light membranous wing, rendering it easy of dispersal by wind agency. The wood of this tree, when British-grown, is not of great value, but when the tree is subjected to the sterner climate of northern Europe it becomes of finer and more useful texture. Hence, the greater part of the pine-wood used in Britain is imported. The tree yields resin, turpentine, tar and pitch.

The Pine, owing to beliefs concerning its mystical origin, holds a conspicuous place in continental legends. A grove of Pines occurs in the Tyrol, and it has come into existence in consequence of an old custom which

Horse Chestnut.

insists that each new wedded couple must plant a marriage tree. In Drayton's "Muses Elysium," the Pine is associated with the god Pan:

> "To Pan we dedicate the Pine,
> Whose slips the shepherd graceth."

Several insects do damage to the tree, among them the Pine Saw-fly (*Lophyrus pini*), the Pine Beetle (*Hylesinus piniperdi*), and the Pine Beauty Moth (*Panolis griseo-variegata*), the grub of which feeds on the leaves, systematically eating them from tip to base.

CHAPTER III

TREES INTRODUCED INTO BRITAIN

1. Angiosperms

In this chapter some account will be given of a number of trees which have been introduced into Britain and most of which have become so firmly established as to be commonly regarded as British.

Yulan (*Magnolia conspicua*).—The members of the Magnolia family, to which this species belongs, display many characteristics of the Ranunculaceæ, or Buttercup family, but whereas in the latter the species are mostly herbs, in the Magnolias they are always shrubs or trees. Magnolias are sometimes called Water-lily trees. The leaves are simple, often of a leathery texture, and the

leaf-buds are wrapped in membranous stipules which twist round them spirally. The Yulan is by no means common in Britain, but it is worthy of mention here because in the south of England its conspicuous and attractive flowers, which appear before the leaves expand, catch the eye and demand attention. These flowers, after a mild winter, may be seen in February, when they are the more conspicuous in that so little other bloom is seen at the same time. They are of large size, fragrant, tulip-shaped; white, tinged with pink, each flower growing alone at the end of a shoot. The leaves are alternately arranged on the shoots; they are a reversed oval in form, tapering sharply to a point at the tip. The leaf-margin may be wavy or quite unbroken by indentations; when young the leaves are downy. The Yulan is cultivated in suitable exposures in many parts of Britain, but north of London it hardly thrives without suitable protection. It grows to a height of 30 or more feet. It was introduced into Britain by Sir Joseph Banks in 1789. Other species of *Magnolia* are cultivated in England, some of them being shrubs.

Tulip Tree (*Liriodendron tulipifera*).—A member of the Magnoliaceæ. Native in North America, and introduced into Britain so long ago as 1688. In its native haunts it becomes a large tree over 150 feet high. On immature trees the bark is thin and scaly, but later it becomes deeply fissured. The leaves are three-lobed, saddle-shaped, and their appearance has led some folk to call the species "Saddletree." The flowers resemble

tulips; they are about 2 inches in depth, greenish-yellowish with various coloured spots, and exceedingly fragrant; the flowering season is June to July. A handsome tree and a hardy: it flourishes in gardens in a rich soil and a sunny exposure. The wood is light and tough and is often called canary whitewood; it is used for floors and polishes well.

Tree of Heaven (*Ailanthus glandulosa*).—A native of China, introduced into Britain in 1751. Cultivated in parks and gardens. An elegant tree remarkable for its leaves which may be 3 feet long, and in some vigorous young plants have been almost double that length. The leaves consist of a long midrib on which shortly-stalked pairs of leaflets are arranged, the leaflets being 2 to 6 inches long and 1½ to 2½ inches broad. When they first develop the leaves are red, but later they become dark-green on the upper surface and a lighter green beneath; they are smooth and leathery; they fall at the first touch of frost. The unpleasant smelling whitish-green flowers are produced in erect, terminal, branched clusters; they may be bisexual (stamens and pistil in one flower), or male alone and female alone. The carpels of the fruit separate, and each one becomes a winged seed-vessel, about an inch or so long, containing a single seed. The wood is white and the bark smooth. The leaf-buds are ruddy, protected by grey down. The tree attains a height of 60 to 100 feet with a rounded crown. At first it grows rapidly, but the growth slackens in pace after ten or so years. Propagated by suckers and root cuttings. Thrives on

chalky soils, and is sufficiently hardy to endure the climate of northern Scotland. The satiny, fine-grained wood is suited for cabinet-making.

Horse Chestnut (*Æsculus Hippocastanum*).—Producing its showy candelabra-like, erect spikes of flowers in April and May, this tree is one of the handsomest and most conspicuous of our flowering trees. It is a native of the Caucasus and the Balkans, and of north India, and was introduced into Britain about 1550. By now it is widely established in parks and gardens and is regarded as "our own." It may attain a height of 100 feet, producing branches in opposite pairs which curve downwards. The trunk has a twisted growth. The bark is greyish-green, rather smooth, and falling in flakes. The ruddy buds borne on stout, smooth twigs are protected by scales covered with a sticky, varnish-like secretion. The scars left by the fallen leaves give the appearance of nailed horse-shoes, and there are folk who say the popular name of the tree is due to this feature, although there are others who declare that "horse" is synonymous with "coarse" and has reference to the uneatable seeds. The wood is soft, consequent upon rapid growth, and is not durable: yet it is even-grained and polishes well and has some value for indoor work. The leaves are broken into usually seven leaflets arranged like outspread fingers. The leaflets vary in size; they are wedge-shaped at the base and oval towards the extremities, quickly tapering to a point at the tip, and with unequally toothed margins. They are of thin texture; in an early stage covered with

down, but smooth later. The leaves, thus composed of sizeable leaflets, are often over a foot broad. The flowers, which are white, flushed with crimson and dotted with yellow, are produced in erect spikes; they consist of a five-lobed calyx including five separate petals. The seven curved stamens are inserted on a fleshy disc; the pistil consists of a three-celled ovary produced into a long, smooth, curved style with stigma at the tip. The upper flowers of the spike are usually male only, while the lower are bisexual. The fruits are familiar objects, especially to small boys who play "conkers" with the large, glossy, dark red seeds. One or two seeds are enclosed in a thick, leathery, spiny capsule. The tree is usually fully twenty years old before it produces fruit. The wood is attacked by caterpillars of the Wood Leopard Moth, which bore into the timber, and the leaves sometimes become spotted through the ravages of a fungoid pest.

The Scarlet Horse-Chestnut (*Æsculus Carnea*), producing handsome red flowers, is a tree of smaller growth, 20 to 30 feet. The bark is lighter than that of *Æ. Hippocastanum*, and there is less resin on the buds. It is native to North America, where it is called "Buck-eye": it was introduced into Britain in 1820. Flowering period, July-August.

Sycamore (*Acer pseudo-platanus*); natural order Sapindaceæ).—In Scotland commonly called the Plane, but this is a misnomer, although its leaves resemble Plane leaves. It is on account of this resemblance that

it is called *pseudo-platanus*, which literally means false or mock plane.

The generic name *Acer* means sharp or hard, and probably it is associated with the hardness of the wood, which, in olden time, was used in the making of sharp-pointed implements and spears. The name Sycamore was given because botanists at first thought the tree identical with the Sycamore of Palestine, but the Palestinian Sycamore is the Mulberry-Fig. The native haunts of the Sycamore are the mountainous regions of central Europe and western Asia, but the tree is now quite naturalized in Britain—indeed, it has been planted and has spread naturally all over. In the fourteenth century it was referred to by Chaucer as a rare exotic; towards the end of the sixteenth century, Gerard said it was found "in the walkes and places of pleasure of noblemen where it is especially planted for the shadowe-sake." The tree has taken kindly to British soil; in some places its seedlings are a nuisance. It does very well in the streets of populous towns and cities, but in such a situation it has to be cut back very freely, and cannot be permitted to develop its true umbrageous form. The Sycamore is also called the Great Maple. It grows rapidly, producing flowers before it is twenty years old, and at fifty or sixty years it is at the zenith of its development, although it may continue to live for over two hundred years. It seldom reaches a height of more than 60 feet, and often it is less. The bark is smooth, ash-grey, breaking off in flakes. The branches are massive. The leaf-buds are protected by olive-

green scales edged with brown. The leaves are heart-shaped at the base, ranging from 4 to 8 inches across, and the blades are divided into five-pointed, unevenly-toothed lobes; the under surface is blue-green. The greenish-yellow flowers appear in May before the leaves are fully developed; they droop in extended clusters, and are much visited by bees, which appreciate the supply of nectar. Each fertile flower may produce two or three seed-vessels, which are furnished with membranous wings which curve downwards, their presence accounting for the ready dispersal of the seed by wind agency. The wood is fine-grained, easily worked when new, but hardening with age. It polishes readily and is sometimes used for furniture, but is not greatly esteemed. The leaves are often covered with black spots which are due to the action of a fungus known as Sycamore Leaf-Blotch.

Laburnum (*Laburnum vulgare*).—Natural order Leguminosæ—the Pea and Bean family. A tree which is common in gardens and parks and gives welcome colour at its flowering season from April to June. The conspicuous drooping clusters of yellow pea-like flowers are produced from the ends of shoots, and the flowers are followed by downy green pods containing from two to seven kidney-shaped poisonous seeds. By the time the seeds are ripe the pod becomes dry and black. Seedlings are freely produced, but they cannot flourish in open places where rabbits abound, because these animals eat their bark, which, curiously enough, is poisonous to cattle. The Laburnum is said to have been

introduced from the mountain forests of south Europe in 1596. It grows to a height of 20 to 25 feet. The trunk is protected by a grey-green, smooth bark. The leaf-buds are silky, protected by a few scales. The coarse-grained wood is dark and hard: it polishes well and is used in cabinet work and turnery. The leaves consist of three leaflets, which are oval, lance-shaped, and often tipped with a short, sharp point; they are downy on the under surface. The larvæ of the Laburnum Moth (*Gemiostema laburnella*) attack the leaves. In some localities the tree is called the Golden Chain, and in others, the Pea tree.

Almond (*Prunus Amygdalus*).—A tree of the Rose family, synonymous with *Amygdalus communis*. A native of the East and of Africa. Naturalized in the south of Europe. Introduced into Britain from Barbary in 1548. Planted in gardens and shrubberies for the sake of its exquisite flowers which are produced in abundance in March and April and appear before the leaves. These flowers are the glory of a garden in early spring and are able to endure the frosts which often occur at that season. Usually rose-coloured, but sometimes white, the flowers grow singly or in pairs. The fruit is a drupe consisting of a fibrous husk which separates into two irregular valves and liberates a pitted stone in which the seed, the familiar almond of the table, is enclosed. In Britain the tree fruits only in very favoured situations in the south of England. The tree attains a height up to 30 feet. The bark is rough. The brown twigs produce small, conical leaf-

London Plane.

buds protected by reddish scales. The branches are slender. The leaves are arranged alternately; they are stalked, the blades being spear-shaped, smooth when mature, but at first hairy underneath. The leaf-margin is toothed, and the lower teeth are glandular, productive of a secretion. The tree has a liking for lime, but seems to prosper in most soils.

In the days of Pliny, the Almond nut was considered to be a remedy for inebriety. In some districts the flowering tree was sacred to the Madonna. The springing of the exquisite flowers at a season of bare branches has suggested the Almond as an emblem of hope, of life emerging from death and joy from dreariness:

> "The hope in dreams of a happier hour,
> That alights on Misery's brow,
> Springs out of the silvery almond-flower,
> That blooms on a leafless bough."

In illustration of such symbology, Hilderic Friend, in his "Flower Lore," quotes the following legend: "Tradition says that in the old days of Grecian heroism, as Demophon was returning from the siege of Troy, he was shipwrecked and cast upon the shores of Thrace. Here he gained the love of the King's daughter, and promised to marry her. Before doing so, however, he resolved to return to his own home and settle his affairs there, promising to return at an early date and make her his bride. Time passed, and Demophon did not return, but his intended bride still hoped on, till at last, finding he tarried long, she pined away and died; when, for her constancy, the gods are said to have

changed her into an almond tree." It used to be a German custom, at a wedding feast, to present an almond to the bride and bridegroom. The old dream-books declare that to dream of eating almonds denotes a journey to be undertaken, and that it will be favourable or the reverse if the taste is sweet or bitter.

Common or Black Mulberry (*Morus nigra*).—Natural order Urticaceæ—the Nettle family. A slow-growing, long-lived tree producing a bulky round head and reaching a height of 30 feet. Sends out horizontal branches. The bark is ruddy and rough. The leaves break out about May and the flowers develop in June or July. The dark green leaves are about 4 inches long and of equal breadth; when young they have soft hairs beneath; the upper surface bears rough hairs; in general outline they are oval and heart-shaped at the base, the margins being irregularly toothed; at the tip they taper quickly to a point. The flowers are greenish-white, not conspicuous, and are clustered in short spikes on a floral receptacle which becomes succulent when ripe. The sexes are usually on the same tree, but sometimes they are separated on different plants. The fruit is a medley of the receptacle, and some of the flower parts become succulent; as it develops it is first green, then crimson; afterwards it becomes red and lastly a ruddy black; it is mature about August.

This tree is a native of Armenia and Persia: it was introduced into Britain in 1548. In Britain it is grown in sheltered gardens and does well in the south of England. The wood is of no great value; it is some-

times used in cabinet work. The leaves provide food for silk-worms when a substitute for the species they thrive on best is needed. The Mulberry upon which these larvæ are usually fed is *Morus alba*, a native of China, in which country the tree has been cultivated as the best food for silk-worms from a remote age. The tree, for purposes of the silk industry, was introduced into south Europe, and its cultivation in France dates from the fifteenth century. An attempt made by James I. to foster the industry in England failed. An old tradition said that the Mulberry was "red with the blood of living hearts." There is a Gloucestershire saying that there will be no more frost after the Mulberry has put forth her green leaf—a fairly intelligent anticipation which needs no mystery to support it.

London Plane (*Platanus acerifolia*).—Also known as the Maple-leaved Plane. Natural order, Platanaceæ. Marked off distinctively from all of the genus *Acer* (Maples and Sycamores) by the leaves being borne alternately, instead of growing opposite as in *Acer*. This species is appropriately associated with London, for it has taken kindly to its climate and abounds in squares, parks, gardens and avenues in and near the metropolis. Its power of resisting soot, dust and fumes renders it a good tree for town-planting. It is a native of Asia and was introduced into Britain in 1724. A handsome tree with smooth bark which scales off in flakes, leaving yellowish-grey patches of under-bark. It attains a fair height, 50 to 60 feet; the upper branches have a fairly erect growth; the lower branches are more

or less horizontal, sometimes declining earthward. The leaves are much like those of the Common Maple. The greenish flowers, which develop in April, hang like a series of " bobbles " on long stalks, from two to four, but usually three, in succession, with long intervals between. The fruit is a bristly ball. The London Plane is being preferred before the Oriental Plane (*Platanus orientalis*) on account of its more rapid growth and the ease with which it can be cultivated. *P. orientalis* was introduced in the sixteenth century. Its leaves are more deeply lobed than those of the *P. acerifolia*.

Walnut (*Juglans regia*); natural order Juglandaceæ).—Native in Persia, the Himalayas and western Asia, probably introduced in the fifteenth century. Name from Walsh (foreign) and nut—*i.e.*, foreign-nut. *Juglans* dates from Roman times, being a contraction of *Jovis glans*, Jupiter's nut. An attractive tree with a big spreading crown, attaining a height of 40 to 60 feet. Stands out among other trees on account of its bright green leaves. The trunk has a girth up to 20 feet; the branches develop a twisted growth with an upward tendency. The bark is grey, smooth in young trees, but becoming rough and fissured as years advance. The leaves, growing alternately, are stalked and of considerable size, up to 12 inches long; they consist of a long stalk, bearing four or more opposite leaflets and a terminal leaflet. The leaflets are shortly stalked, oval and pointed, up to 6 inches long; parallel-veined, smooth, shining grass-green above, paler green beneath;

fragrant when crushed. The sexes occur in separate flowers on the same tree. The flowers are greenish and appear before the leaves; the male are in slender, cylindrical, drooping catkins up to 3 inches long, growing on shoots of the previous year; the female may be solitary or in small clusters produced at the ends of present-year shoots. The fruit is a "nut," really a stone, enclosed in a fleshy envelope, at first green and firm, later decaying. In youth, the wood is white; it becomes brown in older trees; it is light, coarse grained, tough, and beautifully marked: it polishes well and is used for gun-stocks and cabinet work. Unripe fruits are pickled. The juice of the tree yields a brown stain. The flowers usually develop in March.

Sweet Chestnut (*Castanea sativa*); natural order Amentaceæ).—Also called the Spanish Chestnut, native of southern Europe and North Africa. Considered to have been introduced into Britain by the Romans. A stately tree attaining a height of 60 to 80 feet, or even more, with a spreading crown. Lives, on an average, 500 years; there are specimens over 2,000 years old on Mount Etna. In young trees the bark is smooth and brown; in mature trees it is grey and fissured, with a spiral twist. The branches spring out horizontally and turn earthwards. The leaves grow alternately; they are oblong-spear-shaped, deeply toothed on the margin, the teeth terminating in a short, sharp point; veins parallel; surfaces smooth; length up to 9 or 10 inches. The greenish-yellow flowers have an objection-

able odour; they occur in erect catkins, 5 or 6 inches long, produced from the axils of the leaves. Each catkin has flowers of both sexes, the male occurring above and the female towards the base. Male flowers consist of five to twenty stamens protected by a five-lobed perianth; female, two or three in a four-lobed bract, consist of a perianth protecting an ovary surmounted with five to eight reddish radiating stigmas. The fruit contains from one to three brown nuts enclosed in a four-valved greenish cupule covered with spines. The investing cupule corresponds to the acorn-cup of the Oak, to which tree the Chestnut is akin. Fruit is not produced until the tree is about a quarter of a century old, but in Britain it is never abundant and always of poor quality. The Chestnut is found principally in plantations and parks; it flowers from May to July, and the fruit is ripe in October. The wood is sometimes used as a substitute for Oak, but it is not so good in quality; it is employed for fences, posts, etc. The timber of old trees is brittle and of little worth.

Weeping Willow (*Salix Babylonica*).—Conspicuous on lawns by riversides and well known by its "weeping" habit, the idea of weeping being associated with the long, slender, hanging, pale-green branches. The specific name *Babylonica* indicates that the older botanists thought this was the Willow of Babylon referred to by the Psalmist, but in point of fact the tree is a native of Japan and other regions in Asia: it was introduced into Britain from the Levant. So easily

recognized a Willow hardly needs description. The male and female catkins appear about May along with, or immediately after, the leaves. The fruit is seldom developed in our climate.

Black Poplar (*Populus nigra*).—Grows best in moist situations, river banks, etc., but does well planted in park or garden. This poplar is distributed over Europe and temperate Asia, and although it is not considered a British native, it is well established here and naturalized. A tall, rapidly-growing tree, reaching to 80 feet or more. There is nothing particularly "black" about it, and we must assume that it is called "black" in contrast to the White Poplar described in the previous chapter. *P. nigra*, unlike *P. alba*, has no white down on the under sides of its leaves. This tree has an erect habit and produces massive, upward-growing branches. The bark is grey and irregularly furrowed. The young shoots are lustrous, yellow, and smooth. The leaves grow alternately; they vary in outline, but tend towards the triangular; they taper to a point; margin edged with small rounded teeth; the blade is green above and beneath and of stout, tough texture. The sexes occur separately on different trees. The flowers appear in March or April before the leaves: they are clustered in catkins. The male catkins are red, limp and pendulous, extending to 2 or 3 inches: the female are green, shorter than the male, and they do not droop. Fruit, an oval capsule, about ¼ inch long. The capsules mature in May or June and liberate cottony seeds which are readily dispersed

by wind. The wood is white and tough, not easy to split; it is used in turnery and for making charcoal; on the Continent, especially in Holland, wooden shoes (sabots) are made of it.

Lombardy Poplar (*Populus nigra*, v. *pyramidalis*). —Called "Lombardy" because introduced from that district of Italy in 1758. It was first planted in Britain by Lord Rochford at St. Osyth, Essex. The sexes are represented on separate trees, and in consequence of the introduced tree being male, almost all specimens of this variety seen in Britain have been raised from suckers and produce male catkins only. Various theories have been advanced as to the relationship and rank of this tree, but it is now generally considered to be a variety of the Black Poplar. Yet its mode of growth is very distinctive. In form it is spindle-shaped, the branches growing vertically. Growth is quick and the tree is short-lived. It reaches a height of from 100 to 150 feet, and when solitary, stands out as a sentinel in the landscape. It adds to the dignity of the countryside when planted in rows by streams and in hedges. The leaves closely resemble those of *P. nigra*, but they are smooth from youth, whereas the young leaves of *P. nigra* are silky when they first open. The bark is gashed with fissures. The wood is tough, but of no particular value. Trees which appear in excellent health are often decayed at the core and thus apt to blow down without warning.

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2. Gymnosperms

Maiden-hair Tree (*Ginkgo biloba*).—Native of China and Japan; introduced in 1754. Not common in Britain, but some good specimens are to be seen in gardens and parks. It is able to survive existence in smoky towns. The popular name is bestowed on account of the lustrous green, fan-shaped, leathery, lobed leaves which have a resemblance to those of the Maiden-hair Fern. The tree seems to owe its preservation to the fact that it has been held in reverence by the Chinese and Japanese from very ancient times. Western curiosity is securing its cultivation over a wide area. This unique tree has great botanical interest in that it is the solitary survivor of a gymnospermous group dating back to the Permian geological period, in which the naked ovule is fertilized by an actively swimming male cell; this fact brings it into relationship with the Cycads. A height of 60 to 80 feet may be reached. The sexes are separated on different trees; the male flowers occur in slender yellow catkins about 1½ inches long, and the female may occur solitary or in clusters on long foot-stalks. The fruit is an edible, globular or oval drupe, about 1 inch diameter with fleshy pulp. The bark is greyish, fissured and flaky. The wood is yellowish-white, veined, easy to work, and it takes on a good polish.

American Arbor-Vitæ (*Thuja occidentalis*).—Native of North America; introduced in 1596. Planted in

gardens and parks. Evergreen shrub, but grows as a tree 40 to 60 feet. Bark ruddy, orange-tinged, becoming furrowed and flaky. Branches horizontal, bearing smooth, spreading, shining branchlets. Tree an elongated cone in form. The leafy twigs have a resinous fragrance. Both sexes on same tree. Flowers very small, males with four to six stamens; female cone of eight to twelve scales; seeding scales with two upright ovules. The fruit is an ovoid cone, about ½ inch long, with thin, leathery scales. The wood is soft, light, compact, durable and fragrant, with a yellow-brown tinge. The Chinese Arbor-Vitæ (*Thuja orientalis*) is cultivated as a shrub or a pyramidal tree up to 20 feet. It has branches which break out horizontally and afterwards turn upwards to a point. The leaves are lustrous, blue-green when young; later they become dull. A native of China and Japan.

Wellingtonia (*Sequoia gigantea*).—The Mammoth Tree of California, where it reaches a height of well over 300 feet. Introduced into Britain in 1853, so that no specimen has yet been planted long enough to show whether it can attain great proportions in British soil. It is planted in parks. The author has seen flourishing specimens in the Isle of Arran. An evergreen tree which assumes a conical form. It produces short, thick, horizontal branches with slender, somewhat drooping branchlets. Bark red and flaky. Both sexes on the same tree; male flowers abundant; ovules in cone of twenty-five to forty light yellow scales. Fruit a cone up to 3½ inches long and over 2 inches

broad. Seeds ripen in second year. Wood soft, coarse-grained and brittle.

Deciduous Cypress (*Taxodium distichum*).—A beautiful tree which does well in damp parts of parks and gardens. Not evergreen. The bright yellow-green leaves, which are only ½ inch long and very narrow, grow in two opposite rows, and the branchlets bearing them flutter in a feathery manner in the breeze. In autumn the leaves become red. The roots, particularly when the tree is in swampy ground, produce curious excrescent growths called knees. These are hollow and project upwards from 1 to 2 feet; they are presumed to be aerating organs. Male and female flowers on the same tree: males in drooping clusters 4 to 5 inches long; females in twos or threes near the males. Bark ruddy brown, rough. Known in North America, where it is native, as the Swamp Cypress. Introduced into Britain in 1640.

Chile Pine (*Araucaria imbricata*).—Commonly called the Monkey Puzzle. A native of Chile, introduced into Britain in 1796. In town gardens generally makes a poor show, but if grown in a clear atmosphere, with abundant sun and suitable humidity, it does remarkably well. Some very fine specimens are to be seen in the west of Scotland, particularly in sheltered gardens well exposed to the sun and not far from the sea. In a good exposure this distinctive evergreen tree produces luxuriant growth, attaining a height up to 80 or 100 feet. The branches grow in whorls, producing regular branchlets; they curve in an upward direction. In

old trees the lower branches die, so the tree develops a good length of bare trunk, with thick, corky bark. The growth form is cylindrical or pyramidal. The tough leaves encircle the branches; they are sharp-pointed and uncomfortable to handle; they persist for a number of years. In Britain the tree does not fruit except in suitable conditions. Usually the sexes are on different trees. The yellow male flowers, 4 inches or so long, occur in stalked, cylindrical clusters of six or seven, or singly. Female flowers spring from ends of branches; they are about 4 inches long, almost spherical, and protected by overlapping scales with prickly points. After fertilization a large brown cone, 6 to 9 inches long, is formed. When the cone is ripe the scales fall away and liberate two or three hundred almond-shaped winged seeds. The natives of Chile eat the seeds. The wood is useful; it is hard and white.

Spruce Fir (*Picea excelsa*).—Also known as the Norway Spruce. Name "Spruce" from German *sprossen* (young shoots of trees), with probable reference to the use of the shoots in making spruce-beer. Native of high levels in Europe and Asia; introduced into Britain about middle of the sixteenth century, and since extensively planted. A tall, graceful tree of pyramidal form with trunk tapering to a point. In its native ground it may reach a height of 150 or more feet; in our country not usually more than 80 to 100 feet. The whorled branches are produced in tiers from base to apex, the lower ones almost sweeping the soil. The leaves are needle-shaped, sharp, four-angled, about

1 inch in length; they are produced in a spiral arrangement and endure for six or seven years. The sexes occur on the same tree; stalked male flowers grow singly or in twos or threes; the stamens are reddish; the pollen-sacs yellow. Female flowers without stalks are produced at ends of last year's shoots; they develop into brown cones, about 6 inches long, or more, and 1½ to 2 inches in diameter. The cone scales number between 150 and 200; they are thin, flat and sharply cut at the tips; they overlap each other in a loose fashion. Two winged seeds are developed under each scale. Young trees are frequently used as Christmas trees. This is a shallow rooting conifer, the roots radiating horizontally near the surface. The wood is valuable, being elastic, durable, of light weight and even-grained. It is put to many uses: for ship masts, telegraph poles, ladders; it is the "white deal" of the carpenter. Burgundy pitch is extracted from it.

Common Larch (*Larix europea*).—Native in the mountains of central Europe; pure forests covering large areas occur 7,000 feet above sea-level in the Swiss Alps. Introduced into Britain early in the seventeenth century. Thrives remarkably well in Scotland. Unlike many cone-bearing trees, the Larch is not evergreen; its leaves fall in the autumn, and in the winter the tree is bare of everything but cones resulting from the preceding summer's activity. When the Larch produces its leaves in bright green tassels from hanging twigs in the early spring it is fair and graceful to see. The tree may reach a height of 80 to 100 feet. Trunk

tall, straight, tapering to a point; branches spread horizontally, curving upwards; lower branches tending downwards. The form of the tree is pyramidal. The brown bark, on old trees, is very deeply furrowed. The soft, bright green leaves—which are very narrow, flat needles—grow in bundles of thirty to sixty. Both sexes on same tree. Male flowers occur in isolated, stalkless bundles; female in cones, about ½ inch diameter, with crimson-purple scales at first, becoming brown later. The fruit is a loose, erect, oval cone about an inch long, ripe in autumn and persisting on the tree through the winter. The seeds are winged. The yellowish wood is tough and durable, resisting decay in the soil and in the air; hence its use for railway sleepers, fencing, pit-props, scaffolding and telegraph poles. The bark has properties which render it of use in tanning leather. Venice turpentine is obtained from the trunk.

Silver Fir (*Abies pectinata*).—At home in the mountains of central Europe and north Asia where it forms considerable forests. Found in the Pyrenees 6,500 feet above sea-level. May live four hundred years. Introduced into Britain about the beginning of the seventeenth century and thrives well in the moist atmosphere and cool temperature of the north. Attains a height of over 150 feet, with a considerable girth. Grown in dense plantations, the lower branches are shed; but in the open the pyramidal crown almost touches the ground. The erect trunk tapers to a point; it is protected at first by a greyish-brown, smooth

bark, but in old trees the bark is silvery-grey, rough and furrowed. The branches project horizontally, tending to droop at the ends; they grow in tiers. Old trees cease vertical growth and become flat-topped. The linear leaves grow in a spiral arrangement, but by a twist assume a flat position, lying in two horizontal rows. They are a lustrous green above, but silvery beneath—the silvery appearance due to the presence of a white line on each side of the midrib. Male and female flowers on the same tree; males occur crowded in leaf-axils of last year's shoots; they consist of a few whorls of light green scales protecting greenish-yellow male organs. The female cones grow erect on the tips of the preceding year's shoots from the branches. When the female cone is mature it is of considerable size, 6 to 8 inches long and 1½ to 2 inches in diameter. It remains erect in its position, and as the cone-scales would hinder seed-distribution were they to persist, those that bear seeds fall away so as to allow the seeds to be scattered without hindrance. The three-angled seeds have a broad wing. The wood is yellowish-white and does not readily warp; but it is far from being weather-proof. It is used for inside work and is pulped for paper-making. On the Continent it is employed in making wooden toys and packing-cases. The beautifully clear turpentine, known as Strasbourg turpentine, is obtained from resin cavities under the bark. In the woods of Rosneath, Dumbartonshire, there are two great Silver Firs which attract much attention; locally they are known as "Adam and Eve."

They were planted about 250 years ago, and so far back as 1891 they were respectively 130 and 124 feet high, with girths of approximately 23 and 22 feet.

Douglas Fir (*Pseudotsuga douglasii*).—Introduced to England in 1826. Native of North America. As this species has been planted in Britain only for a little over a century, it has not yet had the opportunity of showing what it can do in the way of growth in British surroundings. In its native soil, under the best conditions, it has reached a height of 300 feet with a girth of 30 or 40 feet and an age of seven hundred and fifty years. It has provided a mast for Kew Gardens, imported from Vancouver, the length of which is 159 feet with a circumference of 6 feet at the base. It is distributed over our country, but flourishes best in a humid atmosphere, and in a soil which does not become water-logged: it does well in parts of the west of Scotland. It is named "Douglas" in honour of David Douglas, who was collector for the Royal Horticultural Society and sent home seeds gathered on the Columbia River.

In free growth, the Douglas Fir becomes a graceful pyramid with branches sweeping the ground and the trunk tapering to a point, the topmost leader tending to nod. The branches spread horizontally, the lowest ones bending downwards, the uppermost curving slightly upwards. Branchlets generally emerge in opposite pairs. The thick bark is ruddy and cracked into irregular fissures; it falls away in flakes. The flat linear leaves, about an inch long, arranged in two rows,

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AUTUMN TINTS

closely resemble those of the Silver Fir; they are a rich green above and have two silver lines beneath. Both sexes on the same tree; red male flowers occur in clusters at intervals beneath shoots of last year's growth; small female cones droop from ends of side branchlets; and when mature after the ovules are fertilized they are long-oval, about 3 or 4 inches in length and $1\frac{1}{2}$ inches or more broad, and of a reddish-brown colour, with large scales. The tree fruits after it is a quarter of a century old: the seeds are ruddy and furnished with deep brown wings. The timber is often known as Oregon Pine; it is hard and lasting and polishes well; it is used by shipbuilders and in general constructional work. The leaves persist on the tree for six or seven years.

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